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JOURNAL *of* EDUCATIONAL RESEARCH

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WHAT DO WE KNOW ABOUT OPTIMUM LENGTHS OF LINES IN READING?

ARTHUR I. GATES
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SINCE Adolph Weber, a German investigator, published in 1881 recommendations concerning the optimum length of the line in reading, many tables of optimum lengths have been offered by individuals and committees appointed by such organizations as the American School Hygiene Association, the British Association for the Advancement of Science and the National Society for the Study of Education. Some of these recommendations were made with an authoritative definiteness that gave the impression that the matter was settled beyond doubt, as illustrated by such phrases as "The lines should be .....", "The best length is .....", "The maximum should be set at .....". These phrases seem to imply that the studies of optimum lengths of lines were as decisive and definite as the units of the millimeter scale with which they are measured. Not until one reads the findings of the studies or such competent reviews of the investigations as those of W. S. Gray in his *Summaries* does one realize the lack of evidence for filling in the blanks in such statements.

First of all, it is interesting to note the differences in the various recommendations. Weber's investigations in 1881 led him to recommend lines from 140-150 m.m. as easier to read than longer or shorter ones, whereas Dearborn, in 1905, recommended lines 75 to 85 m.m., in length, and Blackhurst in 1927 states that "the most desirable length of line for the first four grades lies around 100 millimeters."

A survey of the literature will convince any critical reader that the experimental data are as yet quite insufficient either to justify a recommendation of any optimum length or to give promise that there is an optimum between such limits as 75 and 150 millimeters. For the most part the recommendations, in fact, are based not on experimental data but on theoretical speculations.

Javal, the first person to secure objective records of eye-movements, argued that very long lines were likely to be fatiguing to the eyes because of the greater amount of asymmetrical accommodation. It was stated that as the eye moved a greater distance to the left or right of the mid-point of the line, one eye became further than the other from the fixation point, unless the head or book was moved to compensate for the change. While this is true, it remains to be shown that the difference in the adjustment of the eyes between reading lines say of 75 m.m. and 150 m.m. is practically significant. So far as the writer has been able to discover, no objective evidence is available to show that either the mechanism of accommodation, head movements, or both, combined in reading lines of 150 m.m. or longer increases fatigue, develops myopia or produces any other undesirable effects. It should be pointed out that the eyes are admirably constructed for rapid and effective movements over a larger range, vertical as well as horizontal, than that required for reading fairly long lines of print. In ordinary work and play, in observing objects, operating machines, looking at landscapes or observing indoor scenes, the eyes tend to move—and to move with start and stop shifts as in reading—over wider and more complexly patterned areas. Indeed, it is likely that a pupil is more subject to head movements and asymmetrical accommodation when he is not reading than when he is. Finally, the evidence seems to indicate that small and confining eye-movements are the most fatiguing. Sewing, repairing watches, following the movements of the writing pencil and such are the activities which fatigue the eyes. Here, in fact, is a suggestion that reading may be least fatiguing when the print is large and the lines long enough to permit larger and more sweeping movements.

An argument presented by Huey[1] in favor of relatively short lines is that a larger amount of eye-movement is required to read a given selection set up in long lines than in short ones. This argument is based on the observation that a fairly experienced reader tends not to traverse the entire line but to sweep the eyes back and forth between a point a centimeter or two to the left of the beginning and another point to the right of the end of the line. This argument overlooks the fact that materials set up in short lines require more return sweep from right to left than the same materials set up in longer lines. Indeed, the argument conflicts squarely with the recommendation of long lines as a means of avoiding as many of the troublesome return sweeps as possible. The

[1] Huey, E. B. *The Psychology and Pedagogy of Reading*, 1908, pp. 410 ff.

significant point, of course, is that both are purely speculative arguments unsubstantiated by evidence concerning the relations of the factors to fatigue or ease of learning.

Dearborn[2] found fixations to be relatively more numerous but of shorter duration in reading short than long lines. In a sense, there was a tendency to make about so many fixations per line, within limits, whether the line was long or short. This, of course, would mean that the shorter lines in which the material is set up, the greater the number of starts and stops within the lines (as well as the more full line return sweeps) that will be required. Since the stops in reading shorter lines are shorter, it might be argued that the eyes not only do more work but have briefer rests between movements. All of which would seem to be arguments for long lines.

Dearborn, however, favored short rather than long lines. His choice was based chiefly on other considerations. He argued that short lines favored the general process of comprehension. His argument is as follows:

"To summarize, the fixation pauses are uniformly longer at the beginning and at certain other parts of the line. The reason assigned for this peculiarity is that at these places a more general perception is secured of the ideas and words that follow in the line. The succeeding fixations serve to amplify and fill out this general perception. Finally, this expanding of the field of attention is made more frequently and with greater ease in the short line. Since, therefore, it is easier to read when attention and fixation coincide, it is advisable that the arrangement of printing should be so made that the distracting effect of unconnected words on the periphery of vision is minimized and the more important and salient parts of the sentence be found in those places where the eye for more purely physiological reasons naturally dwells."

Although there are other arguments *pro* and *con*, enough have been offered to make it clear that the opinions concerning optimum lengths of reading lines are mainly sheer speculations. The experimental data are often remote from the point. Most of them can be used in arguments for either long or short lines. In most cases, little or no direct evidences concerning the influence of lines of different lengths upon speed, accuracy, or fullness of comprehension, upon ease of acquiring regular eye-movements or other mechanical skills or upon any objective

[2] Dearborn, W. F. *The Psychology of Reading*, Science Press, 1906.

or subjective type of fatigue or upon visual defects or disorders, are offered. In sum, prior to the work of Blackhurst in 1923, substantially all the evidence on length of lines is speculative and to the present writer, at least, quite unconvincing.

Blackhurst's investigation is straightforward in method, and the data are valid so far as they go. As subjects he had 96 children in grades 3 and 4, 48 in grade 2, and 72 in grade 1. The subjects in each of these four groups were divided into as many sub-groups as there were differences in the lengths of lines used, so that the sub-groups could be so rotated as roughly to equalize the influence of the order of reading the several arrangements of the material. For the third and fourth grade pupils, the selections were printed in lengths of 55, 81, 90, 102, 120 and 142 millimeters; for the first and second grades in 55, 80, 91, 103, 123 and 142 millimeters. The criteria of optimum value were: (a) rate of reading the material orally, and (b) numbers of errors. The results are given in terms of the mean number, S.D. of the distribution of scores and S.D. of the mean number of seconds and errors, respectively.

The differences in speed and errors revealed in the data are small in the extreme. Only a statistical microscope could demonstrate perceptible variations. Assuming that the errors are due entirely to sampling and that under the circumstances of the study they are fully revealed by the ordinary Standard Errors of the differences, which the writer doubts, the differences due to lengths of lines lack satisfactory reliability. The trends, moreover, are not entirely consistent; those for errors are noticeably irregular. The writer believes that the soundest interpretation of the data is that variations in the lengths of lines from 55 m.m. to 142 m.m. produce no perceptible differences in speed or accuracy of oral reading under the conditions of the study. Blackhurst's interpretation that the results indicate "the most desirable length of line (to be) around 102 and 103 millimeters" seems to the writer to place too much confidence in the reliability of data. The differences seem too inconsistent, too unreliable and too small to justify placing appreciable importance on the value of line-length when any other consideration such as practical convenience or expense or artistic effects of composition favor longer or shorter lines within the limits of 55 and 142 m.m. Finally, there is no assurance in the data of this study that either the longest or shortest lines used involve more work or fatigue or strain, or that they are in any way less hygienic than the recommended lengths.

One factor which should be carefully taken into account in studies of this kind is the length of line to which the pupils are accustomed and habituated. That variations from the habitual conditions are likely to be disturbing is a fact that has been so repeatedly demonstrated as to be axiomatic in psychology. If pupils are accustomed to reading materials set up in 100 millimeter lines, materials set up in 55 or 142 are likely to look queer, and this alone might be distracting and disturbing. Then, as Dearborn and others have found, eye-movements tend, in some measure, to be specialized to suit lines of different lengths. Hence, if a child's eye-movements are habituated to lines of 100 m.m. or are even more practiced for lines of this length than for others, some loss in transfer to longer or shorter lines may be expected.

Blackhurst checked the line-lengths in about a half-dozen books used in each grade. His conclusion that "there was no uniformity in the length of line, but that many line-lengths were to be found in any book" is entirely correct; his data nevertheless indicates that material set in lengths between 94 and 106, centering around 100 millimeters, strongly predominates. Out of 18 books reported, only one had lines below 80 millimeters; only one had lines above 106, and none had lines above 115 millimeters.

If habituation exerts any influence at all in these cases, it would tend to produce precisely the variations which Blackhurst's data did show. If it exerted the least perceptible influence, it would account for differences at least as great as those that Blackhurst found. If the influence were any greater, the advantage would be turned from the middle lengths to the extremes. The fact that the force of habituation does tend to coincide exactly with Blackhurst's figures on speed, (assuming the differences to be reliable) is sufficient reason, in the writer's opinion for withholding recommendations and tables of standards for lengths of lines in school materials until much more extensive and pertinent investigations have been made.

Some evidence obtained in an investigation conducted by the writer for another purpose has a suggestive reference to, but by no means a conclusive bearing upon, the influence of habituation to one length of line in comparison with experiences with materials of different length. Two first-grade groups equivalent at the beginning of the study in Mental Age, Intelligence Quotient and Reading Ability—or more accurately, in lack of reading experiences—were the subjects. One group,

the Experimental Group, was confined largely during a half school-year to reading from two books, one of which was set up in 100 m.m. and the other in 102 m.m. lines. The other group was confined largely to experimental materials, mainly mimeographed, which were set up in various lengths. About a quarter of the material was set up in lines which varied from 55 to 75 m.m., a little more than a quarter in lines between 75 and 110, another quarter in lines between 110 and 135, and a little less than a quarter between 136 and 175. The lines were not scattered indiscriminately in length within a passage. Usually, a selection occupying from a quarter of a page to a full page was set predominantly in the same length of lines. Thus, the material appeared predominantly in blocks of a given line-length.

At the end of the term the pupils were given a series of tests to determine their competence in different types of silent and oral reading. Three of these tests, which were given orally and timed, were set up predominantly in lengths of 70, 105 and 155 m.m. Since the group using the experimental materials was composed of superior readers at this time, two groups were formed by eliminating best readers of the experimental group and poorest readers from the other, until they were equivalent in reading ability in the composite of the three tests. The influence of the length of the line could then be roughly approximated by comparing the deviation of the average score of each group in each test from the average of the scores of all three tests, in words per minute. The deviations are as follows:

	Experimental Group		Control Group	
	Mean	S.D. Mean	Mean	S.D. Mean
1. Average deviation of score on 70 m.m. line test from score on all tests, in words per minute.....	— 0.18	0.38	— 0.44	0.42
2. Average deviation of score on 105 m.m. line test from score on all tests, in words per minute.....	— 0.11	0.35	+ 1.06	0.59
3. Average deviation of score on 155 m.m. line test from score on all three, in words per minute.....	+ 0.33	0.66	— 0.95	0.62

In the case of the experimental group experienced with various lines, one length was as good as another, since the deviations show no consistent trend and none is as large as the standard error. Taking the mean deviations of the control group, (whose experiences were largely limited to lines of about 100 m.m. in length), there is an indication of greater speed on the 105 m.m. material than on either the longer or shorter

material. The poorest showing of this group, (assuming again the reliability of the deviations) is on the longest lines. This is reasonable, since it is quite certain that these pupils had no extensive experience with lines over 102 m.m., whereas they had some practice upon the shorter lines in their material in the cases of sentences which did not fill out the line. However, the deviations, appraised in terms of the standard errors, are seen to be insufficiently reliable to justify this as more than a suggestion. At any rate, the most plausible assumption is that children do tend to become habituated to a line of the length in which their materials are predominantly set up, whereas they become adapted to widely different lengths so that one is as optimum as another when they have substantial experiences with materials of different lengths of line. Since the most used books in the elementary grades are school readers which are now set up in lines close to 100 m.m., it may therefore be expected that tests upon such children will show them slightly more at home with this length than with markedly longer or shorter lines. To claim that such a length is in any fundamental sense optimum is in such a case quite unjustified.

The writer is therefore in most hearty accord with W. S. Gray who in his *Summaries* concluded: "Additional evidence is necessary before standards can be adopted with full assurance of their validity," and with the National Committee on Reading which in 1925 stated that "There are at present no data in children's reading which enable us to say with assurance that lines should be short rather than long."

A STUDY OF COMPARATIVE VALIDITY AS SHOWN BY A GROUP OF OBJECTIVE TESTS

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IN an investigation dealing with various phases of teaching method, a number of different types of carefully prepared objective tests were used. As the study progressed it became apparent that, as a by-product, it would be possible to make some comparisons among the various types of tests. Accordingly, as soon as sufficient tests were given, the data were arranged and some rather interesting results brought to light. The present report is more or less preliminary, for as soon as the major investigation is completed there will be several times as many tests given as are here reported, and more dependable conclusions can be obtained.

THE PROBLEM

The specific problem that is considered in this paper is how the various types of objective tests used in the study compare with one another as valid measures of the type of intellectual processes which they measure. In other words, using as the criterion the mean score made by each pupil on all his tests, what correlations do the various test types give when compared with the criterion?

EXPERIMENTAL PROCEDURE

In nine classes in general science, four during the year 1928-29, and five during the fall of 1929, a series of twelve different tests representing five different units were administered. They were as follows:

a. Three tests on "Weather and Climate," given both years.
b. Two tests on "Heating and Ventilating," given during 1928-29.
c. Two tests on "Disease Prevention," given 1928-29.
d. Three tests on "Providing a Good Water Supply," given in the fall of 1929.
e. Two tests on "Providing a Good Food Supply," given in the fall of 1929.

The tests used in this investigation were comprehension tests rather than fact-recall or information tests. They were formulated in accord-

ance with the plan described by Bayles.[1] Although subject to human error, these tests go further than usual toward testing the ability to *use* ideas, rather than ability to *recall* and *reproduce* facts. This gives added significance to the results hereinafter reported.

Six different tests types are represented, a sample of each being appended at the close of this article. They are, (1) controlled completion (story method), (2) modified true-false, (3) divided sentence or matching, (4) multiple choice (every response being marked as right or wrong), (5) controlled completion (sentence method), and (6) true-false. The test forms used on each of the various units were as follows:

Weather and Climate:
- Test 1, Controlled completion (sentence method).
- Test 2, Divided sentence.
- Test 3, True-false.

Heating and Ventilating:
- Test 1, True-false.
- Test 2, Divided sentence.

Disease Prevention:
- Test 1, Modified true-false.
- Test 2, True-false.

The Water Supply:
- Test 1, Modified true-false.
- Test 2, Multiple choice.
- Test 3, Controlled completion (story method).

The Food Supply:
- Test 1, Modified true-false.
- Test 2, True-false.

The original purpose of administering these tests was to equate the different forms for each unit. Due to the lack of class time that could be given to testing, it was out of the question to give each form to every student, so equivalent groups were obtained by passing out the tests alternately in one-two or one-two-three order, Form I going to student A, Form II to student B, Form III to student C, and so forth, around the class. Thus, each student took one test over each unit tested, and each test form is given to one-third or one-half of the entire group of students, picked at random. This number is more than enough to assure its being an adequate sampling of the entire group. Three different units were represented in the 1928-29 data, and three in the data for 1929-30. The

[1] Bayles, E. E. "Testing for Comprehension," *Journal of Educational Research*, XX (November 1929), pp. 268-72.

unit on "Weather and Climate" was used both years. Each of the other four units was used one year only. The total number of times an entire group of about 120 students was represented was fifteen, the 1928-29 group being represented seven times and the 1929-30 group eight times. This makes the results that are here presented representative of more than 1800 student-performances. Altogether, more than 240 different students are represented, and 690 tests were given. Each test included 25-40 items.

All raw scores for each and every test were converted into T-scores by the method described by McCall.[2] These T-scores were used to represent each of the individual test types. The mean score for each student was obtained by taking the arithmetical mean of all T-scores made by the student on the various tests which he took. Each mean score is the mean of the scores for three different tests, resulting, of course, from the fact that three units were represented in 1928-29 and three in 1929-30. Correlations were then calculated for the various test types as follows: Taking the first type, say modified true-false, all scores made by students on modified true-false tests were paired and correlated with the corresponding mean scores made by those same students—the ones that took the modified true-false tests. The same was done for each of the other types. Otis Correlation Charts were used in making the computations.

The mean score is, of course, based on different combinations of scores for different students. While for student A the mean may be made up of scores from tests of the modified true-false, divided sentence, and multiple choice types; the mean for student B may be made up of scores from tests of the true-false, controlled completion, and multiple choice types. This method would tend to work a hardship on the test form which is used the least number of times, but the peculiar thing is that one of the two forms which was represented by only one test (the controlled completion, story type) was the one which ranked highest, and the type which was represented the largest number of times (the true-false, used on four different tests) was the one which ranked lowest. The evidence seems to be that any influence that may have been exerted by this variable has been cancelled out and has not affected the results one way or the other.

---

[2] McCall, William H. *How to Measure in Education.* (New York: Macmillan Company, 1922), pp. 290-291.

RESULTS

Table I presents the correlations obtained, with the results for each year kept separate. The data were so arranged in order to show the close correspondence of the results for the two different years. The S.D., which is the measure of variability that is employed, also shows that the tests have been given to a sufficient number of students to furnish fairly constant correlations.

TABLE I

CORRELATIONS BETWEEN MEAN SCORES AND SCORES ON THE VARIOUS TYPES OF OBJECTIVE TESTS USED IN THIS INVESTIGATION*

Year given	Test type	No. of students actually taking the test	No. of students represented by the test	No. of different tests represented	Coeff. of Correlation (r)	S.D.$_r$
29-30	Controlled Completion (story)	39	127	1	.908	±.028
29-30	Modified true-false	104	254	2	.852	±.027
29-30	Divided sentence	41	127	1	.849	±.044
28-29	Modified true-false	53	115	1	.840	±.040
28-29	Divided sentence	89	230	2	.836	±.032
29-30	Multiple choice	40	127	1	.834	±.042
28-29	Controlled Completion (sentence)	37	115	1	.825	±.053
29-30	Controlled Completion (sentence)	42	127	1	.803	±.054
28-29	True-false	144	345	3	.752	±.040
29-30	True-false	101	254	2	.745	±.045
	Totals	690	1821	15		
28-29	Grade percentile rank based on Terman Mental Test	107	115	1	.568	±.065

* The mean scores were obtained by taking the arithmetical mean of all scores made by a given student on all tests taken by him. Each test score was paired with the mean score made by the student who made the test score.

In Table II, the data of Table I are condensed by throwing both years together. This was done by taking, for each test type, the arithmetical mean of the two coefficients (one for each year). This will tend to make the coefficients of Table II slightly conservative, that is, lower than they would be if both frequency distributions were thrown together and the coefficients recalculated. The difference, however, is so slight that to make the additional computations was not considered of sufficient advantage to be worth the extra time required.[3] For this table the S.D.'s are

[3] To show the difference, controlled completion (sentence method) and controlled completion (story method) tests were first thrown together, giving a coefficient of .886. When these two were computed separately, they gave correlations of .803 and .908, respectively. Thus, the arithmetical mean of these two is .855, which is .031 below the true coefficient for these two distributions. This gives reasonable assurance that the method used in Table II furnishes conservative coefficients of correlation.

recalculated, using the data in columns 2 and 5 (Table II), and employing the formula, S.D. $= \frac{1 - r^2}{\sqrt{N}}$.

TABLE II

CONDENSED TABLE OF CORRELATIONS BETWEEN MEAN SCORES AND SCORES ON THE VARIOUS TYPES OF OBJECTIVE TESTS USED IN THIS INVESTIGATION

Test type	No. of students actually taking the test	No. of students represented by the sampling	No. of different tests represented	Coeff. of Correlation (r)	S.D.$_r$
1. Controlled Completion (story)	39	127	1	.908	±.028
2. Modified true-false	157	369	3	.846	±.023
3. Divided sentence	130	357	3	.843	±.025
4. Multiple choice	40	127	1	.834	±.042
5. Controlled Completion (sentence)	79	242	2	.814	±.038
6. True-false	245	599	5	.749	±.028
Totals	690	1821	15		

The reliability of the obtained differences is computed by the use of the formula

$$\text{Reliability of the Difference} = \frac{\text{Difference}}{\text{S.D. of the difference}}$$

To be practically certain that the true difference will be in the same direction as the obtained difference, the above formula should give a quotient of three or better. The ratio of the actual quotient to three indicates the fractional part that the actual difference is of what it should have been to assure practical certainty that the true difference is in the same direction as the obtained difference. For example, a quotient of 4.1 is considerably larger than a sufficient indication of practical certainty, and a quotient of 1.7 shows that the difference is $^{17}/_{30}$, or 57 percent, as large as it should be to assure practical certainty.[4] Table III shows the reliabilities of the differences obtained in this investigation.

TABLE III

SHOWING THE RELIABILITIES OF THE OBTAINED DIFFERENCES

Test types compared (Numbers refer to same types as in Table II)	S. D. of the Difference	Difference / S. D. of the Difference
1 and 6	.039	4.1
2 and 6	.036	2.7
3 and 6	.037	2.5
1 and 5	.047	2.0
4 and 6	.050	1.7
1 and 2	.036	1.7

[4] "Practical certainty" is arbitrarily taken as a 370 to 1 chance, since in any normal distribution a distance of 3 sigma on both sides of the mean includes all but 0.27 percent of all cases represented in the distribution.

Table III shows that, under conditions similar to those in this investigation, the modified true-false tests and the divided sentence (or matching) tests are almost certain to be more valid for measuring the mental processes employed in these tests, as a group, than the ordinary true-false tests. It also shows that the controlled completion (story method) tests are more than "practically certain" to be more valid than the true-false tests.

That the reliabilities shown by Table III are conservative is assured by the fact that, although the 690 tests were given in such a way as to be truly representative of 1821 student-performances, nevertheless, in calculating the S.D.'s shown in the three tables, the number (N) of cases taken is the number of only those which actually took the tests, and not the larger number. The method of handling the data that is used here gives larger S.D.$_r$'s and thereby lower reliability values.

COMMENTS

In commenting upon these results, it may be well to point out that the modified true-false tests that were used were given the least care in formulation of any of the forms, and as a result, their ranking was very much of a surprise, as it is probably somewhat below what it would have been had more care been taken in preparing them. Moreover, although one's first impression is that they will require a much longer time for scoring than any of the other types, since all the other types can be scored with a prepared key, experience shows that if the papers are spread out side-by-side on a long table so that the examiner can take item one and mark that one on each and every paper, then similarly take item two and each other item in order, the time taken for scoring one of these sets averages only about twice that taken for scoring one of the other types by the use of a key. The time is much longer and the results less satisfactory, however, if a whole paper is examined by itself before the next paper is taken up.

The raw scores on the true-false type were determined for the 1928-29 group by the right-minus-wrong formula. For the 1929-30 group, the items-right method was used for the most part. It is barely possible that the method used for obtaining the raw score has made some difference, but the probabilities are against it, especially in view of the fact that the correlation coefficients are so nearly the same—.752 for 1928-29 and .745 for 1929-30.

The large difference between the two types of controlled completion test is surprising and rather hard to explain. The sentence method was given to 78 students altogether, representing the whole group twice. This is representative of about 240 student performances, while the story method, given to 42 students, represents the group once, or about 120 student performances. Either 120 or 240 performances is a high enough number to give results that are fairly dependable, and the S.D.'s are both low, so one is almost bound to acknowledge that there is significance in the result. It may be that the greater continuity of thought afforded by the story method is the determining factor.

CONCLUSIONS

In the light of the results from this investigation, one is justified in concluding that, with conditions similar to those described,

1. The controlled completion (story method) type of objective test is practically certain to be a more valid measure of the intellectual processes which these tests measure than is the ordinary true-false type.
2. The controlled completion (story method) type seems to be a more valid measure than any other of the test forms used in this investigation.
3. The modified true-false type, the divided sentence or matching type, and the multiple choice type appear to be approximately equivalent.
4. The ordinary true-false type is quite probably the least valid of any of the types of objective tests studied.
5. The controlled completion (story method) type appears to be a more valid measure than the controlled completion (sentence method) type.
6. While the above conclusions are fairly reliable, they must await confirmation from more complete data which will include not only general science material, but material taken from other courses as well.

SAMPLES OF THE TESTS[5]

1. Controlled completion type (story method).
   Directions: In both the blank space and also in the parenthesis, place the number of the proper completion.

In a country home, in order to insure a pure water supply from a well which is placed at the most convenient point, without regard to the	1. seldom 2. deep 3. top of well

[5] The reader should note that these are only parts of tests, therefore incomplete, and cannot be used for testing purposes.

( ) location of barn lot or outbuildings, a ..... well should be used, the upper sides of which
( ) are ..... In such a well the water will
( ) always stand as high as the ..... This
( ) height will probably be ..... in wet weather than in dry weather.

4. lower
5. often
6. shallow
7. open
8. never

2. Modified true-false statement type.

Directions: Leave all true statements as they are; change all false ones so as to make them true, positive statements.

a. A city located at the foot of a mountain would probably get its water from the mountain streams.

b. The water in a well gets into the well by draining through cracks about the top of the well.

c. If a ledge of solid rock is exposed part way up the side of a hill, a spring will be rather likely to occur at some place along the upper side of this ledge.

3. Divided sentence type.

Directions: In the parenthesis place the number of the proper completion.

a. Water which has been boiling for an hour in an open vessel ( )
b. In the steam heating system, the steam circulates through the pipes to the radiators because it ( )

1. is heavier when cooled than when hot.
2. is not used.
3. is hotter than when it had boiled 15 minutes.
4. keeps the steam from bursting the pipes.

4. Multiple choice type.

Directions: In the parenthesis place a plus if the completion makes a true statement and a minus if completed statement is false.

a. A well that is situated near the house or barnyard should be
   1. water-tight, without chance for a leak, from top to bottom. ( ) 1.
   2. cased or concrete-lined part way down, and open near the bottom. ( ) 2.
   3. open for entrance of water from top to bottom ( ) 3.

b. An artesian well in which the water gushes out all the time
   1. usually receives its supply from a nearby river. ( ) 1.
   2. receives its supply from some source that is below the well. ( ) 2.
   3. is always fed by some source that is above the well. ( ) 3.
   4. will usually supply pure water since it runs long distances underneath the ground. ( ) 4.

5. Controlled completion type (sentence method).
Directions: In the parenthesis, place the number of the blank in which the word or phrase to the right of the parenthesis is to be used.

a. In the southern hemisphere, the further (1) one goes the colder it becomes. ( ) south of ( ) direct
b. The poles are cold regions because of the (2) rays of the sun. ( ) cold ( ) at
c. During our winter, the hottest part of the earth is (3) the geographical equator. ( ) slanting ( ) the same as
d. In our summer, the Torrid Zone is further (4) than it is in our winter. ( ) south ( ) colder

6. True-false type.
Directions: In the parenthesis place a plus if the statement is true and a minus if it is false.

a. The roots of some plants are used as food for man. ( ) a.
b. The food, that is produced in plants and used by man, is food that the plant has stored up for future use, and has been taken by man and used for a purpose other than that for which the plant has produced it. ( ) b.
c. In the starch-making process in plants, the carbon dioxide and water that are needed are both taken from the soil. ( ) c.

COMPARISON OF THE TWO-RESPONSE AND DICTATED RECALL TYPES OF SPELLING TESTS

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IN testing spelling ability, as in testing content subjects, the traditional approach has been through the medium of recall tests. To-day, as in the old-fashioned "Spelling School," the most common method of testing spelling ability in elementary or secondary schools is the dictation method. The principal change is in the mode of responding, answers being written instead of oral, and sometimes in context form. But if spelling ability is to be included among the mental functions measured in survey tests of the college entrance type, requirements of economy in administration and scoring direct our attention toward the more convenient multiple-choice technique with visual presentation.

This paper reports a study made in October, 1929, primarily to discover the relative reliabilities of the Two-response and Dictated Recall types of tests at the college freshman level, and incidentally to throw some light on certain related questions, namely:

1. In OR[1] tests dictated by different persons, is the variability of these persons, that is, the variability of the stimulus, a factor in score production?
2. What is the immediate effect of a single test experience upon student ability in the case of spelling? Is it negative, positive, or zero? Will initial errors written or observed reduce the scores on a second test?
3. What individual differences, if any, will be found in student reactions to the choice situations of a Two-response test?

MATERIALS

A Two-response test of 75 words with the correct spellings miscellaneously alternated through two columns of 75 words each was included in the English section of the battery of entrance tests given to all freshmen at Iowa State Teachers College in September, 1929. In each horizontal pair one spelling was correct while the other was the most fre-

[1] Throughout this paper OR represents the usual Oral Dictation method, while 2R signifies the Two-response or two-alternative procedure. The symbols were adopted to conform with the nomenclature used by W. S. Guiler in "Validation of Methods of Testing Spelling," *Journal of Educational Research*, XX (October, 1929), 181-189, a copy of which reached my desk two or three days after the testing herewith reported was completed.

quent misspelling found among freshmen in the same institution in a preliminary study. The student recorded all answers by number only, on a portion of a special answer booklet provided for the test of which this was one unit.[2]

This graded list of 75 words was used in two ways for the purpose of this study. As a Two-Response (2R) test it was given exactly as in the original freshman entrance test, except that mimeographed forms were substituted for the answer booklets mentioned above. When the test was given in OR form, the instructor dictated the words from a typed list of the 75 words in the same order.

SUBJECTS AND PROCEDURE

Each of four instructors coöperating in the study gave each form of the test to two sections of approximately equal size. All sections were enrolled in the same subject and included both freshmen and sophomores. One section from each instructor was listed in Group I and the other section was placed in Group II. The selection was so made as to balance the groups with respect to class hours. Each instructor first gave the 2R form of test in his Group I section, following it immediately with the OR form, dictating the words from his typed list and observing uniform typed directions. Since the code answers to the 2R test left no information for the student, the words spelled from dictation were written on the same answer blank, immediately following on the right the respective answers of the first test.

In Group II sections the OR test was given first; the papers were collected; another set of answer blanks was handed to the class, and the 2R test followed.

DATA AND INTERPRETATION

Table I shows that instructor A's 24 students made 343 errors on the 2R type of test and 413 errors on the OR test immediately following, averaging 14.3 and 17.2 respectively. Similarly, Table II shows that B's 28 students averaged 12.8 and 17.8 errors on the 2R and OR tests respectively when the OR test preceded the 2R. Comparison of totals or means suggests a tendency to profit by the brief test experience. For the entire Group II, errors on the 2R test when following the OR test average 14.0 as compared with 15.2 in Group I. Again, errors on OR average 21.3 in Group II but only 19.4 in Group I when the OR is in

[2] Iowa State Teachers College English Test (1929).

the preferred position for learning. These differences are only about twice the probable errors of the difference, .54 and .85 respectively, but our inference that the influence of the first test is positive and significant is confirmed by analysis of individual student reactions.

TABLE I

GROUP I (TEST ORDER: 2R-OR)

Instructor	Number of cases	Total Errors		Mean Errors	
		2R	OR	2R	OR
A	24	343	413	14.3	17.2
B	31	479	599	15.4	19.3
C	31	512	775	16.5	25.0
D	60	884	1041	14.7	17.4
Totals	146	2218	2828	15.2	19.4
P.E. of Mean				.39	.60

TABLE II

GROUP II (TEST ORDER: OR-2R)

Instructor	Number of cases	Total Errors		Mean Errors	
		2R	OR	2R	OR
A	25	373	630	14.9	25.2
B	28	358	499	12.8	17.8
C	32	469	681	14.6	21.7
D	58	803	1228	13.9	21.2
Totals	143	2003	3038	14.0	21.3
P.E. of Mean				.40	.61

TABLE III

ANALYSIS OF TYPE ERRORS, SHOWING INDIVIDUAL DIFFERENCES

Instructor	Number of cases	Number of students with errors indicated			% Distribution of errors		
		2R>OR	2R=OR	2R<OR	2R>OR	2R=OR	2R<OR
GROUP I (2R-OR)							
A	24	6	3	15	25	12.5	62.5
B	31	7	7	17	22.5	22.5	55.0
C	31	4	1	26	12.9	3.2	83.9
D	60	23	4	33	38.4	6.7	54.9
	146	40	15	91	27.4	10.2	62.4
GROUP II (OR-2R)							
A	25	0	1	24	0.0	4.0	96.0
B	28	3	2	23	10.7	7.2	82.1
C	32	1	2	29	3.1	6.2	90.7
D	58	4	2	52	6.9	3.5	89.6
	143	8	7	128	5.6	4.9	89.5

TABLE IV

INSTRUCTORS' VARIATIONS, 2 GROUPS COMBINED

Instructor	Number of cases	Total Errors		Mean Errors		S. D.	
		2R	OR	2R	OR	2R	OR
A	49	716	1043	14.6 ± .59	21.3 ± 1.02	6.11	10.58
B	59	837	1098	14.2 ± .72	18.6 ± 1.03	8.14	11.77
C	63	981	1456	15.6 ± .61	23.1 ± .89	7.18	10.53
D	118	1687	2269	14.3 ± .42	19.2 ± .66	6.69	10.57
Totals	289	4221	5866	14.6 ± .28	20.3 ± .43	7.1	10.8

TABLE V

CORRELATIONS

All 2R vs. OR,	289 cases,	r = .69 ± .02
2R vs. OR, Group I (2R-OR)	146 cases	.70 ± .03
2R vs. OR, Group II (OR-2R)	143 cases	.71 ± .03
Reliability (Odd-even)		
2R	146 cases	.634 ± .03
OR	143 cases	.851 ± .02

In Table III we read that in Group I six of A's students made more errors on the 2R than on the OR, three students made an equal number of errors on the two types of test, and fifteen students made more errors on the OR than on the one where chance should have aided. For the same instructor in Group II no students have more errors on 2R (the test in preferred position for learning), only one made an equal number of errors on the two tests, and twenty-four of the twenty-five had more errors, or lower scores, on the OR. Of the eight such comparisons, which may be made from the first two columns, only one fails to fit our assumption that the second test has an advantage. Instructor C has two students making equal scores by the two methods in Group II compared with one such case in Group I, but the numbers are very small.

While those who are concerned about persistence of "initial errors" might expect that this 2R test built to include the most tempting errors would lead students astray, the net effect of the test exposures seems to have been a small positive learning.

INSTRUCTORS' VARIATIONS

Individual differences in instructors are suggested by wide variations in OR data from classes of approximately equal scholastic ability. Confirmation of this inference is found in Tables I and II showing the mean number of errors per class. The classes are ranked alike by the two methods in Group I and again in Group II, the rank order in spelling

ability being for the former ADBC and for the latter BDCA, (Tables I and II). In Table IV it may be observed that the means of the OR column are somewhat more variable than those of the 2R column, the OR differences being from two to more than four times the probable error, while the 2R differences ranged from one to three times PE. The data, although not conclusive, suggest the presence of significant differences in dictation among instructors. On the whole, however, it is surprising to find these differences so small, unless the specific instructions provided in writing to the instructors—instructions more detailed than commonly furnished for spelling tests—are credited with marked influence. If such is the case, might those interested in the direction of statewide spelling tests for eighth grade pupils or prospective teachers limit their assistants in similar fashion as one means of promoting fair play?

MERITS OF THE 2R TEST

Merits and limitations of the 2R form of test for spelling may be discovered in several ways. This test admittedly allows 50-50 guessing, assuming complete ignorance, a fact which may be met in gross by the usual correction for chance. Thus, in Tables I and II the Mean 2R for the two groups combined may be doubled to conform with the R-W formula; or a better comparison, double the 2R Mean of Group I and compare with the OR mean of Group II where each is given first in the normal testing situation. This would yield scores too low, a correction of 1½ making the means about equal to the corresponding OR means. The failure of the usual formula is not surprising in view of the fact that the alternative spellings were selected on the basis of prevalence among college students.

Analysis of the misspellings made on the OR test yielded from two to four or more kinds of error on all words except the first one, "interesting," which was missed by only one of the 289 students. The distributions of errors varied, some words having only one or two common misspellings, while others like "chasm" and "ecstasy," yielded a wide variety of forms. From these facts it would appear that the chances of guessing on the 2R test are not 50-50 for each word, that for some of the easy words the chances were 95-5 in the student's favor, while for the more troublesome words the wrong form might even be a positive attraction for a given student. Hence, we must conclude that a 2R test of spelling as used here is not, statistically speaking, a "two-response"

recognition test, and cannot be treated as the best samples of factual True-False test.

VALIDITY AND RELIABILITY

Since our 2R test was originally designed to serve as an element in an entrance test battery, its validity will be determined primarily by correlation with college marks, singly and collectively. As a measure of spelling ability *per se* we have the correlation[3] between 2R and OR for the combined groups, (r equals .69 ± .02). OR is here considered the criterion of validity because (1) OR is the common form of spelling test, and (2) OR more nearly duplicates the life situations for which spelling instruction should prepare.

Guiler,[4] judging three forms of test by the criterion "the potency with which the different methods discover words that students cannot spell," concluded that WR (Wrong Response[5]) was superior to OR or to a 4-alternative multiple-choice test. Recognizing the thoroughness of his analysis with reference to his proposed criterion we question whether such a criterion completely satisfies the curricular aim, "to develop ability to spell correctly in normal connected written discourse." Both the WR and OR have the merit of requiring recall on the part of the student and actual writing of the word, with sentence context in mind. But spelling words previously learned should be automatic; the introspection of good spellers seldom finds especial attention to the letter elements of the known word in normal writing although recent photographic study[6] shows that such attention in learning to spell is characteristic of good spellers. In the absence of spelling data for our 75 words in the students' normal written discourse we shall therefore consider the correlation with OR as a measure of validity.

The raw correlations of chance halves of the tests, .851 and .634, yield reliability coefficients of .92 and .77 for the complete tests. This indicates that 2R is suitable for use in a survey battery, but only the OR is justified by our data as a tool for individual diagnosis.

Statistical data reported above are based on the assumption of a normal distribution. Analysis of our original raw scores shows skewness

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[3] Table V.

[4] *Op. cit.*

[5] Illustrated thus: "Can you (recomend) this man? (recommend)"

[6] Abernethy, Ethel M. *Journal of Educational Psychology*, XX (December, 1929), pp. 695-701.

for both 2R and OR (Sk equals 1.79 and 3.48 respectively[7]); hence we have supplemented the foregoing with a brief study of overlapping, the chief features of which are stated thus:

1. The lowest decile on 2R were rather evenly distributed over the entire lower half of OR, including one case at the median of OR.
2. The highest decile on 2R ranged from the 60th to 100th percentile on OR.
3. The lowest decile on OR is widely scattered over the entire lower half of 2R, and one student who ranked at the 5th percentile OR was at the 72nd percentile on 2R.
4. The highest decile on OR covered the entire upper half of 2R.

Since the 2R test requires much less time in administration we may calculate the reliabilities[8] for extensions of this type of test:

2R of 75 words has Reliability of .78
2R of 150 words has Reliability of .876
2R of 225 words has Reliability of .914

It thus appears that a 2R test of 225 words which would require about 25-30 minutes (3 times the time required for the 75-word test) would have a reliability equal to that of the 75-word OR type of test, assuming comparable selection of the words used. This would be about equal to the time required to give the 75-word OR form.

If the 225-word 2R test is to have any justification, it would seem, than, that we must find it in greater ease and speed of scoring. In this study we found it necessary to select excellent spellers as scorers and then to train them on their doubtful words before scoring. Secondly, the scoring rate for OR papers was 2 to 3 per five-minute period, compared with 8 to 10 of the 2R for the same period, for the same workers. For 1000 students' papers this saving might amount to twenty hours, and the work could be handled by any clerks available without reference to spelling ability.

On the other hand, it may be difficult to extend the list of words as required (to 225), and such a list, if provided, might prove too monotonous and by altering the students' test attitude, nullify the expected gain.

There is, of course, the alternative of improving the recognition form of test by making it a 3- or 4-choice test. If such a test did not prove

[7] Kelley, T. L. "Statistical Method," (1923), p. 77.
[8] Read from tables prepared by Edgerton, H. A., and Toops, H. A., in *Journal of Educational Research*, XVIII (October, 1928), pp. 230-233.

to be, in reality, a 2-response test (i.e., two spellings too obviously wrong) this might be an improvement over either the 2-response or dictated form, administration and scoring both considered.

SUMMARY AND CONCLUSIONS

1. College freshmen and sophomores showed a small net positive practice effect when tested over a list of 75 words by two methods in immediate succession, regardless of the order (2R-OR and OR-2R).

2. The reliability coefficient of 2R for 145 cases, using a test of 75 words, was .778 while OR under comparable conditions yielded the figure .92.

3. 2R yielded scores comparable in size with OR only when corrected by deducting 1½ for each error. The formula, R-W, over-penalizes in this case.

4. Studied by percentiles, overlapping of the two types of tests showed marked individual variations. In general, the extreme decile on either test extended over the entire corresponding half of the other form of test.

5. The use of spelling tests with more than two alternatives is limited by the fact that the actual number of tempting errors varies widely with the individual and with the word. The number of different misspellings in a sample of 60 cases ranged from one for the easiest word in the list to eighteen for one of the difficult ones. Difficulty and variety of misspelling showed little correlation.

6. Our 2R test must be tripled in length to equal the OR in reliability.

A STUDY OF ACHIEVEMENT IN VARIOUS ENGINEERING AND PRE-ENGINEERING COURSES

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Do engineering students exhibit distinctly specialized abilities in connection with their courses in the college of engineering as contrasted with their abilities in pre-engineering subjects? Does success in certain pre-engineering courses, such as physics, chemistry, and freshman mathematics, presage success in the more specialized courses in engineering? Are students consistent in their achievements in college courses, or do they show great variations in achievement in various subjects, engineering and pre-engineering?

This study was undertaken to answer the above questions. Certain difficulties, however, were experienced in making the investigation. The first of these difficulties was that of obtaining a common means of expressing ratings in several courses so that they might be compared. The only records kept at the University of Minnesota, where this study was carried on, are letter ratings, A, B, C, D, E, and F, with others occasionally used. This six point scale (or really a five point scale, as used here) was, itself, too restricted to make possible accurate comparisons. The matter was further complicated by the fact that these letters did not have the same meaning in the different colleges, nor in the different courses within the same college. They did not even mean exactly the same for consecutive classes in the same course. Bohan[1] has discussed these variations at considerable length in his doctor's thesis.

One method of expressing letter ratings in different courses in comparable terms is to assign numerical ratings to letter grades in accordance with the frequencies with which these letters are given in the individual courses. Hence McCall's[2] T score technique may be used to assign the numerical ratings to the letters. These numerical ratings will hereafter be called "M" scores, rather than T scores, because the median is not based on a group of twelve-year olds as it is when T scores are found. Where there are no great discrepancies from year to year in the number

[1] Bohan, J. E. "Students' Marks in University Courses," Doctor's thesis, University of Minnesota, 1926.

[2] McCall, W. A. *How to Measure in Education.* New York: Macmillan Co., 1922.

of A's, B's, etc., assigned by different instructors to their classes, this method makes a fairly accurate means of equating the letter marks.

In this study, 162 engineering students, who had studied mechanics in the fall quarter 1927-28, were selected as a group to be investigated. The data were obtained from twenty-four courses in the department of Civil, Mechanical, and Electrical Engineering. Letter marks ranging from 130 to 1025 in number were obtained for these courses for several preceding years. Most of them exceeded 500 in number for each course. From these marks M scores were computed. The M values ranged from 23.0 to 73.6 for all courses.

An examination of these letter mark values for the various courses from the original tables makes it evident that where failures are frequent, the numerical value of an F is raised considerably, thus making the range of scores and the computed standard deviations less. Where A's are frequent, the tendency is to likewise make their value less and to lower the range and computed standard deviation. This shows clearly the objection to a five point scale and the desirability of a 15 to 20 point scale. The data to follow must be interpreted in the light of these unavoidable discrepancies.

DO STUDENTS SHOW MUCH VARIATION FROM PRE-ENGINEERING TO ENGINEERING COURSES?

In the attempt to answer this question, letter marks were collected for all courses taken in the freshman, sophomore, and junior years by the 162 students, though the marks in the junior courses were not complete for the whole year. Tabulations were made showing the M scores for each student in each of the courses he had taken during this time. The average M scores for each student for engineering and pre-engineering courses, respectively,[3] were then computed and the difference obtained. The mean of the differences for all students was found to be 4.31 $\pm$.26 scale points with a standard deviation of 3.28. Since the total range of M scores for pre-engineering courses among the 162 students was from 39.45 to 69.97, and for engineering courses from 38.33 to 66.97 or approximately 29 points, the mean difference is found to be about $\frac{1}{7}$ of the total range. The standard deviation of the M scores in engineering and pre-engineering courses is approximately 5.5 for each. The mean of the

[3] Physics (Mechanics, Heat, Optics, and Electricity and Magnetism, under four different instructors), Chemistry, Freshman Mathematics (Algebra and Trigonometry) and Differential and Integral Calculus are the pre-engineering courses considered.

differences in these M scores is thus less than the standard deviation of the scores and but slightly greater than the standard deviation of the differences. Table I makes more detailed comparisons.

TABLE I

NUMBER OF INDIVIDUAL STUDENTS HAVING CERTAIN DIFFERENCES BETWEEN M SCORES IN ENGINEERING AND PRE-ENGINEERING COURSES

Difference	Number	%	Difference	Number	%
0– .99 points	18	12.6	6–6.99 points	12	8.4
1–1.99 points	20	14.0	7–7.99 points	6	4.2
2–2.99 points	18	12.6	8–8.99 points	8	5.6
3–3.99 points	17	11.9	9–9.99 points	3	2.1
4–4.99 points	18	12.6	More than 10	10	7.0
5–5.99 points	13	9.1			

Sixty-three and six-tenths percent of the students had differences less than five; twenty-nine and four-tenths percent between 5 and 9.9; and seven percent had more than 10 scale points.

The correlation between ratings in engineering and pre-engineering courses is $.52 \pm .04$ for 154 cases. Other correlations are given in Table II.

TABLE II

CORRELATION WITH MEAN ACHIEVEMENT IN ENGINEERING COURSES

Rating	Coefficient	P.E.	Cases
All Mathematics	.40	.05	119
Freshman Mathematics	.27	.06	112
Physics	.57	.04	103
Chemistry	.45	.05	138

Of all the ratings given, those in physics correlate most highly with those in engineering. The mean ratings in all pre-engineering courses rank second, chemistry third, and mathematics fourth. The evidence shows that the mean ratings in physics (mechanics, heat, magnetism and electricity) are related more closely to the ratings in combined engineering subjects than those of any other criterion. It may be said that there is a tendency for high ratings in physics to be attended with high ratings in engineering courses. A similar, though less marked tendency, is found with the other criteria given. Table III, which shows more detailed comparisons between physics and engineering, together with Table I, indicates more clearly the real relationships than the coefficient of correlation alone.

TABLE III

NUMBER OF INDIVIDUAL STUDENTS HAVING CERTAIN DIFFERENCES BETWEEN M SCORES IN PHYSICS AND ENGINEERING

Difference	Number	%	Difference	Number	%
0– .99 points	18	12.4	6–6.99 points	11	7.6
1–1.99 points	16	11.0	7–7.99 points	10	6.9
2–2.99 points	19	13.1	8–8.99 points	7	4.8
3–3.99 points	16	11.0	9–9.99 points	7	4.8
4–4.99 points	7	4.8	More than 10	19	13.1
5–5.99 points	15	10.3			

Comparisons of Tables I and III seem to show closer relationships between engineering and pre-engineering than between physics and engineering. Fifty-two and three-tenths percent of the students have differences in ratings in the latter comparison of less than 5 points, as compared with 63.7 percent in the former comparison. Even though the coefficient is higher in the latter comparison, a greater number of students have small differences in the former.

Table IV gives other correlations interesting in studying relationships between achievements in various courses.

TABLE IV

CORRELATIONS BETWEEN ACHIEVEMENTS IN VARIOUS COURSES

Engineering Courses	Other Courses	Coefficient	P.E.	Cases
Statics	Mechanics	.44	.06	78
Statics	Chemistry	.35	.07	70
Statics	Shop	.28	.07	70
Statics	English	.03	.08	68
Statics	Mathematics	.34	.07	69
Statics	Drawing	.17	.08	70
Drafting	Optics	.09	.09	61
Drafting	Mathematics	.10	.07	96
Drafting	English	—.11	.07	96
Drafting	Shop	.40	.06	96
Drafting	Drawing	.42	.06	96
Drafting	Chemistry	.15	.07	95
Drafting	College Algebra	.23	.08	67
Drafting	Mechanics	.28	.06	102
Drafting	Heat	.23	.06	99
Drafting	Electricity	.31	.06	91
Drafting	D. Calculus	.16	.07	102
Drafting	I. Calculus	.22	.07	83
Shop	Other subjects	.42	.04	146
Drawing	Other subjects	.27	.05	147

The correlations introduce additional evidence either that there are many factors operating to produce achievement in the various courses, or that ratings are not significant, or both. The factors which have operated to produce the degree of selection in the group of students treated here have actually produced a group within which no criterion of achievement which has been found is very valuable in forecasting future achievement. The complete data give evidence that there are many students who show consistent achievement in all courses; there are others who seem quite inconsistent. Some students seem to do either good or poor work consistently, while others seem much more dependent in their achievement upon the nature of the work they are doing. The best students in engineering tend to be best in all courses, however, and likewise the poorest tend to be poorest in all courses.

CONSISTENCY AS A CHARACTERISTIC

A method of determining the consistency of individuals suggests itself from a consideration of these M scores. The mean of all ratings of a given student, apparently, is a good criterion from which to judge consistency. For example, if the differences in the M scores in individual courses and the mean M score in all courses are found, their consistency or inconsistency in magnitude may serve as an index of consistency for an individual.

Such a procedure was followed with the engineering students in this group. The mean M score for each student was computed as a criterion; the difference between this mean and the M score for each course was found; and the differences between each individual mean difference and the average of those for the whole group were listed. The tables are not reproduced here, but the important final index of a student's consistency is his minus or plus deviation from the mean deviation of the group.

ARE THOSE WHO ARE MOST VARIABLE AMONG THE BETTER OR POORER STUDENTS?

In order to get an answer to this question the mean rating in all courses was used as a criterion of a good or a poor student. The higher a student's mean rating, the better student he is taken to be. A rating based on the average M score in so many courses should certainly represent a fair criterion of good or poor scholarship. The ratings of the 20 students having the highest plus deviations were contrasted with the 20 having the highest minus deviations (most variable versus least variable). Table V presents a summary of the data.

TABLE V

SUMMARY OF MEAN RATINGS OF THOSE WHO VARY CONSIDERABLY MORE OF LESS THAN THE AVERAGE STUDENT
(Variation of 1.5 or more as criterion)

More		*Less*	
Mean	54.02 ± .94	Mean	46.50 ± 1.48
S.D.	4.22	S.D.	6.62
Difference of Means 7.52 ± 1.75*			
Difference ÷ S.E. of Difference = 4.3			

* Standard Error.

The difference in means divided by the standard error of the difference gives a ratio of 4.3, which shows a significant difference between the 20 most variable and least variable students.[4] In other words, there

[4] The possibility of this being a spurious difference should be considered. It would have been preferable to express deviations in terms of coefficients of variability.

seems to be a tendency for the better students to be more variable or inconsistent in their course ratings. There are individual exceptions, however, to this tendency. For example, the very best student in the group ranks high in consistency.

SUMMARY

1. A large number of students in this study showed relatively small variations between ratings in engineering and pre-engineering courses. There were, however, a small number who showed considerable variation, and from course to course as well.

2. According to coefficients of correlation, the following four criteria rank highest in predicting success in engineering courses, in order of rank: physics, all pre-engineering courses, chemistry, and mathematics. None of them are very valuable, however, with this group of students.

3. Correlations between ratings in single courses are not high but are nearly all positive. English correlates lowest with all of the engineering subjects. Shop, drawing, and drafting are indicated as a group most differing from the other courses in engineering.

4. A distribution of differences between two sets of measures discloses relationships not always disclosed by a coefficient of correlation. That is, there may be a greater percentage of low differences in one comparison than in another similar comparison, even though the coefficient of correlation be lower in the first instance.

5. There is evidence which indicates that the best students are, on the average, more variable than the poorest students. This should, however, be accepted with reservations.

PUBLICATION OF EDUCATIONAL RESEARCH*

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THREE stages may be distinguished in educational research: conducting the research, writing it up, and securing publicity for it either verbally or by the printed page. A distinguished professor's dictum that heaven is a place where one may carry on investigations without having to write them up strikes a sympathetic chord in the breast of many an educational scientist.

Most research, to be of much value to any other than the one who makes it, must be given some publicity. Meetings of research associations furnish a limited opportunity for verbal presentation of important results, in summary form, but lack permanence and possibility of convenient reference and further study. Under present conditions, publication of research is indispensable if it is to be of permanent value. More extensive investigations are usually published in book or monograph form, but the most common form of publication is in the numerous educational and psychological journals.

What are the conditions under which such journals are most likely to accept articles? How long should they be? Should charts and tables be used? What is their policy as to proof and reprints? These and similar questions are of interest to those who have work of their own which they wish published. Feeling the need for more definite information on such points the writer addressed the following letter to the editors of the leading educational journals:

"We wish to assemble information which will be of value to prospective contributors to educational journals among the graduate students in the School of Education at Stanford University. Will you be kind enough to answer the questions on the enclosed sheet regarding the policy of your journal. We trust that this information, when assembled, may result in a better class of articles being prepared and submitted to journals which are most likely to use them. It should materially lighten the editorial burden of reading and returning unsuitable manuscripts."

From over four hundred educational journals listed in the fifth yearbook of the Educational Press Association of America, 79 of the most prominent journals of national circulation were selected and letters sent to them. Replies were received from 59, ten of which are not used,

* Presidential address before ninth annual conference of California Educational Research Association, San Jose State College, San Jose, California, April 25, 1930.

leaving 49 replies which are summarized in the remainder of this paper.

The first question asked was, "Do you accept unsolicited contributions for publication from graduate students in education?" Six of the ten whose replies were not used replied that they did not. These were *Educational Foundations, Federation Notes,* the *High School Quarterly, Scholastic, Bulletin of the American Association of University Professors,* and *Teachers College Record.*

Another question asked at the end of the blank was, "If it should develop that the information here furnished is of sufficient interest to merit publication, are there any items which you would prefer not to have published with reference to your journal?" A few journals specified items regarding proof-reading and remuneration for omission, but for the most part no restrictions were attached. Their preferences have been strictly followed. Four journals furnished the desired information, but asked that none of it be published. These were *Survey, American School Board Journal, Journal of Educational Psychology,* and *Educational Administration and Supervision.* The publishers of the latter two journals wrote as follows:

"We prefer that neither *Educational Administration and Supervision,* nor *The Journal of Educational Psychology* be included in the list you are preparing, since in both cases our space is now mortgaged so far ahead that we are not in a position to take on additional material."

The names of the remaining 49 journals, their approximate circulation as reported by their editors[1] and the key number by which they will be referred to subsequently in this paper, are as follows:

No.	Name	Approx. Circulation
1.	*American Childhood*	20,000
2.	*American Journal of Psychology*	.....
3.	*American Speech*	2,500
4.	*American Teacher*	10,000
5.	*Association of American Colleges Bulletin*	3,500
6.	*Business Education*	.....
7.	*California Quarterly of Secondary Education*	4,000

[1] For two of the journals which preferred not to have the general information which they furnished appear in published form, circulation figures are available from Ayer's *Directory of Newspapers and Periodicals, 1930.* This gives the *Survey* (mid-monthly) as 14,580 and the *American School Board Journal* as 11,955. With regard to *Educational Administration and Supervision* and the *Journal of Educational Psychology* the publishers wrote: "Since we do not solicit advertising, we have consistently declined to publish information concerning our circulation."

8.	*Classical Journal*	6,300
9.	*Education*	3,000
10.	*Educational Method*	4,000
11.	*Educational Record*	2,200
12.	*Educational Research Bulletin (Ohio State)*	7,000
13.	*Elementary School Journal*	7,415
14.	*English Journal*	11,000
15.	*Federation Notes*	1,200
16.	*Grade Teacher*	.....
17.	*Hispania*	2,000
18.	*Industrial Arts Magazine*	12,000
19.	*Industrial Education Magazine*	.....
20.	*Journal of Adult Education*	2,000
21.	*Journal of Amer. Association of University Women*	35,000
22.	*Journal of American Statistical Association*	2,400
23.	*Journal of Business Education*	8,000
24.	*Journal of Chemical Education*	12,000
25.	*Journal of Educational Research*	2,000
26.	*Journal of Engineering Education*	2,500
27.	*Journal of Experimental Psychology*	500
28.	*Journal of Geography*	5,000
29.	*Journal of Higher Education*	.....
30.	*Journal of Home Economics*	8,500
31.	*Journal of the National Education Association*	200,000
32.	*Journal of Social Hygiene*	4,000
33.	*Mathematics Teacher*	5,000
34.	*Modern Language Journal*	4,000
35.	*National Geographic Magazine*	1,300,000
36.	*Nation's Schools*	9,600
37.	*Peabody Journal of Education*	2,500
38.	*Phi Delta Kappan*	8,000
39.	*Psychological Bulletin*	650
40.	*Psychological Review*	.....
41.	*Religious Education*	3,200
42.	*Research Bulletin in Commercial Education*	530
43.	*School and Society*	5,200
44.	*School Life*	10,000
45.	*School Review*	5,225
46.	*School Science and Mathematics*	6,000
47.	*Sociology and Social Research*	1,500
48.	*Teachers Journal and Abstract*	1,500
49.	*Vocational Guidance Magazine*	3,000

1. As already stated, the first question read: "Do you accept unsolicited contributions for publication from graduate students in edu-

cation?" Ten of the 49 journals which replied affirmatively qualified their answers in some way. The replies may be summarized as follows:

Yes[2] (1, 2, 3, 4, 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, 40, 41, 42, 44, 45, 46, 48.)	39
If they are worth while (33)	1
Sometimes (47, 49)	2
Occasionally (9, 10, 11, 19, 39, 43)	6
Not as a policy. Seldom accept such except when the study is made in connection with this office (5)	1
	49

2. The next question was "Is there any restriction to the field you attempt to cover other than that indicated by the title of your journal? *e.g.*, elementary, secondary, collegiate, research, special topics, etc.?"

All but fifteen replied "No." Exceptions are noted below:

Penmanship and commercial education only (6)
Secondary and collegiate (8)
Results of experiments or investigations (13)
Two editions, college and secondary (14)
Commercial education (15)
Favor practical articles, rather than theory (16)
Applications of statistical methodology (22)
Very limited amount in collegiate field (28)
Larger matters of general policy (31)
Elementary and secondary field (33)
Stress pedagogy of modern foreign languages (34)
School administration, founded upon research and studies (36)
Short and rather controversial in character (39)
Secondary. Results of experiments or investigations (45)
Junior and senior high school given preference (46)

3. "What is the desirable or maximum length of articles that you ordinarily consider favorably for publication." Replies to this question varied widely, and obviously exact answers were not possible, nor expected. Of 41 replies received, 27 indicate a desirable maximum of 4,000 words or less, although one says 25,000 words. Replies to "desirable or maximum" length may be summarized approximately as follows:

[2] Numbers printed in parentheses refer to the periodicals listed above.

1000 words (31)	1
1500 words (16, 23)	2
2000 words (5, 15)	2
2500 words (20, 24, 36, 47)	4
3000 words (1, 14, 18, 21, 28, 44)	6
3500 words (13, 42, 45)	3
4000 words (4, 10, 22, 29, 39, 48)	6
5000 words (30)	1
6000 words (41, 46)	2
7000 words (35)	1
8000 words (49)	1
10000 words (12, 34)	2
25000 words (2)	1
5 pages (38)	1
10 pages (8, 25)	2
15 pages (33)	1
20 pages (3, 7, 17, 27)	4
25 pages (40)	1
	41

"Desirable limits" were expressed in addition to maximum ones by a few journals. In general this was about one half the length of the maximum. These were as follows:

1000 words (15)
2500 words (4, 30)
3000 words (41)
5000 words (12)
7500 words (2)
6–10 pages (7)
Prefer short articles (46)
If longer than 2500 words, articles are published in installments (24)
Short articles are more likely to be accepted and are nearly always published more promptly than long ones (37)
As short as clearness permits (43)

4. "Do you prefer charts?" Less than half of the replies were favorable. Seventeen were an unqualified "no."

Favorable

Yes (18, 24, 46)	3
If you mean illustrations, half-tones, etc., yes (44)	1
Yes, if they help, but are expensive to print (33)	1
If they add to the clarity of the article (2, 25)	2
Where needed (23, 27, 35)	3
Some but not too many (36, 47)	2

Can use them (1, 37, 43)	3
Only very simple, popular charts (31)	1
As author prefers (7)	1
Should be kept to a minimum (30)	1
	18

Unfavorable

Rarely (17)	1
No, unless article requires (41)	1
No, but can use occasionally (9)	1
No, but we take them if necessary (34)	1
No preference (29)	1
No (3, 5, 8, 10, 13, 15, 16, 20, 21, 22, 32, 38, 39, 42, 45, 48, 49)	17
	22

5. "Do you prefer tables?" The policy of the journals is practically the same as it is with reference to charts, but a shade more favorable to tables.

Favorable

Yes (13, 18, 24, 42, 45, 46)	6
Yes, if they help, but are expensive to print (33)	1
If they add to the clarity of the article (2, 25)	2
Where needed (23, 27)	2
Some but not too many (36, 47)	2
Can use them (1, 37, 43)	3
As author prefers (7)	1
Should be kept to minimum (30, 49)	2
	19

Unfavorable

Only when necessary (14)	1
Rarely (17)	1
No, but can use occasionally (9)	1
No, unless article requires (41)	1
No, but we take them if necessary (34)	1
No preference (29)	1
No (3, 5, 8, 10, 15, 16, 20, 21, 31, 32, 35, 38, 39, 44, 48)	15
No. Dislike them. Too expensive	1
	22

Strong preference, for either charts or tables, for keeping them to the minimum required for understanding of the subject and prepared with more care than many authors give to this exacting but essential part of their work. Charts should be drawn in India ink, with legends on separate sheets. (30)

6. "Do you pay for contributions accepted?" 7. "If so, at what rate?" Answers to question six were negative or blank, except as noted below in the case of ten journals:

Yes; 1¢ a word. (1)
To a few regular contributors only. (6)
Yes; by subscriptions at regular price, or as agreed (9)
Yes; $3.00 per column for unsolicited material (16)
Two copies for each page of author's article or a subscription for as many issues as pages in article (13, 45)
Yes; average of ½¢ per word (18)
Yes; 1 to 2¢ per word (23)
Yes; no specified rate. Determined by importance and quality of the article (35)
Yes (36)
No; we charge authors for their cuts, and part of the costs of their tables. (2)

8. "Do you furnish the author, without cost, extra copies of an issue containing his article? If so, how many?" The policy with respect to this matter varies widely, from four journals which give no extra copies, to one which gives as many as a hundred. Where few or no copies are given, however, the journal is likely to have a rather liberal policy in the matter of free reprints. All but one (36) of the four giving no extra copies furnish free reprints. Conversely, those giving free copies of the journal are likely to give no reprints. The matter of reprints is considered in the next question. Number of copies furnished, without cost, are summarized below:

None	(2, 22, 36, 40)	4
1–4	(9, 14, 16, 23, 25, 29, 30, 34, 38, 41)	10
5	(10, 21, 39, 42, 47, 48)	6
6–10	(1, 7, 8, 11, 17, 20, 33, 37, 44, 46, 49)	11
12–15	(12, 15, 35)	3
20	(24)	1
10–25	(31)	1
10–100, according to length	(43)	1
10, or 1 year's subscription	(28)	1
Yes, if desired	(32)	1
Varies	(5)	1
1 copy for each page of author's article	(18)	1
2 copies for each page of author's article or subscription for as many issues as pages in article	(13, 45)	2
		43

9. "Are reprints furnished, without cost, to the author? If so, how many?" Thirty of the journals reporting, furnish no reprints free to the author.

No; none (1, 4, 5, 7, 9, 10, 12, 13, 15, 18, 20, 21, 23, 24, 30, 31, 33, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 48, 49)	29
25 copies (3, 8, 25, 29, 34)	5
50 copies (17, 22, 32, 39, 40)	5
100 copies (2, 11, 14)	3
Occasionally; number depends upon the purpose (16)	1
Up to 50. The author pays extra costs, (tables, cuts, and formulas) above $10.00 (27)	1
No; we pay ½ cost of 100 or less, ½ cost of 200 or less, etc. (28)	1
Not yet, but have plans for furnishing 25 (47)	1
	46

10. "If reprints are not furnished without cost, what is the approximate charge per page for 4 pages, 100 copies? 300 copies?" With journals of varying size of page and quality of stock, uniformity would scarcely be expected. Yet these factors would hardly account for the wide variations shown in the replies to this question, some journals charging ten times as much as others.

100 copies—without covers

$1.00 (4, 22)	2
2.00–2.99 (24, 46)	2
3.00–3.99 (12, 13, 15, 30, 33, 45)	6
4.00–4.99 (21, 32, 39, 43)	4
5.00–5.99 (28, 41, 49)	3
8.00–8.99 (31, 42)	2
10.00 (1, 10)	2
Reasonable—at cost (9, 37)	2
	23

300 copies—without covers

$2.00– 2.99 (4)	1
3.00– 3.99 (22, 24)	2
4.00– 4.99 (13, 30, 45, 46)	4
5.00– 5.99 (21, 32, 33, 43)	4
6.00– 6.99 (28, 39, 41)	3
7.00– 7.99 (49)	1
9.00– 9.99 (31)	1
10.00–10.99 (42)	1
12.00–12.99 (10)	1
13.00–13.99 (1)	1
	19

$8.50 per page for 500 copies (23)

Prices, for covers, where given, vary as stated below:

First 100	*Additional hundreds*	
2.1 cents each	0.9 cents each	(24)
2.1 cents each	1.5 cents each	(28)
2.5 cents each	1.0 cents each	(30)
2.8 cents each	1.4 cents each	(13, 45)
3.2 cents each	1.2 cents each	(21)
3.3 cents each	1.5 cents each	(43)
3.5 cents each	1.0 cents each	(46)
5.0 cents each	0.8 cents each	(41)

Regular printed schedules of prices of reprints were furnished by eleven journals (13, 21, 22, 24, 28, 30, 32, 41, 43, 45, 46).

11. "Do you send the author proof of articles accepted, before publication?" This is done regularly by slightly over half of the journals. A fourth of them never do it.

Yes (2, 3, 5, 8, 10, 13, 14, 21, 22, 24, 25, 27, 28, 29, 30, 32, 33, 34, 39, 40, 43, 45, 46)	23
If he requests it (7, 9, 12, 15, 17, 23, 41, 48)	8
To those close at hand but not to those at great distance because of delays involved (47)	1
Not as a rule (38)	1
Rarely practicable (35)	1
Usually not. Our experience is against this. We do, when editorial problems arise. Our financial margin is narrow and we cannot afford to make the changes which authors usually insert into proof as afterthoughts (37)	1
No. (1, 4, 11, 16, 18, 20, 31, 42, 44, 49)	10
	45

12. "If you have any printed instructions or suggestions for contributors, please send a copy." Such instructions, varying in length from one to eight pages, were furnished by thirteen journals (1, 2, 8, 16, 18, 24, 25, 27, 28, 30, 31, 39, 40). One states that the editor devotes one page each year to this subject in the magazine itself. (16).

Several of the psychological journals (2, 27, 39, 40) refer to the excellent set of standards and suggestions adopted by the conference of editors of Psychological and Anthropological journals under the auspices of the National Research Council November 30 and December 1, 1928, at Washington, D. C., and printed in the *Psychological Bulletin*.[3] These cover the matters of length and physical characteristics of the manu-

[3] *Psychological Bulletin*, XXVI (February, 1929), pp. 57-63.

script, logical headings, subdivisions and articulation, introductory sections, main body of article, summary, abstract, references and footnotes, tabular matter and illustrations. They are worthy of careful study by all prospective contributors to this type of journal.

Other suggestions deal with types of articles desired, length, style, and suggestions for preparation of manuscript (1, 8, 18, 24, 25, 31); personal data desired for table of contents (28), classical allusions and citations (8). One furnished a valuable four-page reprint dealing with style, sequence of topics, form of statistical data, titles of charts and tables, citations, editorial changes, and thesis preparation (30). Two excerpts from the latter may be quoted:

"In order to tell its story to the reader with the minimum effort on his part a paper should include the following: A statement of the reason for carrying on the work; the general circumstances under which it was done; the methods followed; the findings obtained; the conclusions drawn from these; and, if it is a report of any length, a summary of the whole. . . . .

"The form in which statistical data are set up frequently shows decided lack of care. . . . . The top and side heads in a table do not always describe correctly the data to which they refer, or bring out the true relations between the various sets of figures. The niceties of such 'cabinet making' belong among the intellectual arts, but apparently our amateur craftsmen do not always take the simple precaution of inspecting their tables to see if they stand firm on logical feet. They should realize that an experienced scientific writer or editor will revise a table over and over again in the attempt to make it show its meaning clearly and quickly. The danger from the easy use of current scientific jargon is nowhere more apparent than in making tables, which have a cruel power to reveal confusion of reasoning."[4]

13. "Please state some criteria which you employ to determine whether a research article is worthy of publication in your journal." Twenty-seven journals replied, with answers varying in length from a single line to a full page. Quotation of some of these should prove stimulating and helpful.

Must have application of practical school room methods. (1)

Every article is read by two or more editors. It is judged upon the basis of problem, method, and results; upon the exposition; and upon the form of the mss. If the problem, or method, or the results are in any way deficient or defective, the mss. is declined, no matter how good the

[4] "The Preparation of Scientific Papers," *Journal of Home Economics*, XXI (October, 1929), 771-74.

exposition or how neat the mss. If they are sound and the exposition halting, or written in poor English, or the ms. slovenly typewritten with many misspellings, an effort is made to save the article. It is returned to the author with suggestions. (2, 25)

We depend largely upon the recommendation of the dean or professor under whom the research article has been prepared. Sometimes the editor risks his own judgment. (7)

Must be helpful and interesting to high-school teachers. (8)

Criteria for judging the worth of an article:

1. Problem—Is the problem clearly stated? Has the author kept the problem in mind throughout the discussion?
2. Methods and data—Are the data suited to the purposes stated? Have they been critically examined? Are the methods used in accord with the canons of scientific research?
3. Results—Have the results been critically appraised? If statistical measures are used, have they been critically interpreted? Are these statistical measures essential to the development of the discussion? Is the discussion clearly and pointedly expressed? Are the results the outcome of the methods used?
4. Summary and Conclusion—Is the summary limited to the points discussed in the article? Are all the conclusions justified by the data given in the discussion? (12, 29)

Must be based on definite investigations. Must confirm earlier important findings or must establish new important conclusions. (13, 45)

I consult experts along the lines covered by such articles. (16)

In general, short illustrated articles describing work actually accomplished will be given preference over personal opinions and theory. In describing projects and experiments, it is desired that the contributor give all the important facts, the failures with the successes, that others may profit by the experience of the writer. In the preparation of material, it is desired that the writer take it for granted that the reader is familiar with the theory and history of education, art and industry. (18)

Criteria include scientific quality of work, form of presentation, and general importance or timeliness of subject from the point of view of home economics. Also, since there are relatively few magazines open to certain phases of home economics in which development is needed, research in them is sometimes given preference. (30)

We are interested in publishing the results of research in our field if we think it can be read by the majority of our subscribers. Obviously some of the research reports are not understood by anyone; in some cases perhaps not by the author himself. (33)

We want articles founded upon research into problems of school administration. We do not want teaching procedures or articles dealing with pedagogical subjects. Mere description of administrative pro-

cedures without a foundation of study are not welcome. Well illustrated articles are particularly wanted. (36)

There are now many hundreds of graduate students in education, most of them writing theses or at least course papers. We have 3,000 or more such students in a year ourselves. No journal could publish the average output of this group, worthy as it perhaps is. The valuable, unusual article, however, which is far above the average deserves consideration. Articles must be valuable, immediately valuable, to progressive teachers and administrators. We like facts. Dull papers, whatever the facts, are probably not acceptable; and many research papers are very dull. We are willing to accept philosophy and opinion, if it strikes us as valuable; we do not think the truth is altogether statistical. We do not promote fads or self-advertising. Poorly written papers (and they are very common) simply take their chances. We may do anything to them—except publish them as they are. If they are careless and slovenly we do not always even return them. If they have pure gold buried deep in them (a few have), we may possibly dig it out by cutting the paper to pieces, turning fifteen pages into three, and rewriting much of the wording. Such an author takes what he gets and, at any rate, gets more than he deserves. (37)

We prefer that a research article be more of the nature of a news report regarding the research, than that it be the report of the research. Such a news report will usually contain enough of the findings and of the procedure employed to give our readers some idea of the research. If they are interested they may then make contacts with the complete research report. A research article, then, should be a clear, concise and accurate descriptive account of the research, together with the major conclusions. We prefer reports on research pertaining to general professional or administrative problems, as distinguished from research on purely academic problems. (38)

Every article must be approved by two or more departmental editors or a department editor and the editor-in-chief. Articles must have value to teachers. Summaries or abstracts of research are desired rather than detailed reports. (46)

Article must present result of special research or new program. Some philosophy is all right, but practical work best. (49)

SHORTER ARTICLES

SOME EXTRA-MURAL AND INTRA-MURAL COMPARISONS IN COLLEGE ABILITY AND ACHIEVEMENT

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IT is the purpose of this paper to report a study of the comparative achievement and mental capacities of extra and intra-mural students in a few University of Minnesota classes. No claim is made that the groups included in the study constitute a complete or adequate sampling of all evening and day classes. Comparisons, however, have been made for achievement or intelligence, or both, where data have been available for the groups compared.

The comparative achievement and ability of extra-mural and intra-mural classes in educational psychology is given in Table I. While the exact abilities of the intra-mural groups are not given, it is most probable that in general they are slightly above the abilities of the extra-mural classes.

The three classes in group I were given the same examination while the classes in group II were given the same examination but a different one from that given the three classes in group I. The same instructor did not teach all the classes. That fact constitutes a variable, but hardly one that should alter results. Considerable evidence has been compiled at the University of Minnesota in connection with various classes in Educational Psychology that the instructional factor does not influence achievement as measured by central tendency when the variables of student ability and assignments are held constant.

TABLE I

COMPARATIVE OUTCOME IN EDUCATIONAL PSYCHOLOGY

Class	Achievement[1]	College Ability[2] (Intelligence)	No. students
Group I			
Duluth (extra-mural)	140	53.2	84
St. Paul (extra-mural)	137.5	60.4	24
Campus (intra-mural)	130	58.[3]	358
Group II			
Minneapolis (extra-mural)	171.7	54.3	59
Campus (intra-mural)	166.7	58.[3]	218

[1] Score on an objective examination.
[2] Miller Analogies Test used in College of Education.
[3] 58 is the median score for juniors entering college of education. Educational Psychology is taken primarily by juniors, as it is a pre-requisite for subsequent work.

The off-campus classes are made up of experienced teachers, older and more mature than full-time students, who utilize university credits to elevate their position in the salary schedule, and eventually secure the college degree which qualifies its holders for distinctly better salaries. Furthermore these teachers do not minimize the significance of credit for quality. These conditions, and probably a keener desire to acquire information, the writer construes as incentives which bring about better achievement by the type of persons taking educational psychology while employed full-time.

Table II contains data pertaining to the relative achievement in History of Education. The teacher for the classes presented in Table II was the same in all cases. The same examinations were used for both the intra- and extra-mural classes of each group. The intra-mural classes achieve nearly as well in History of Education as do the extra-mural groups. The differences are not marked and not significant empirically. From the instructional viewpoint it is evident that standards and procedures need not differ quantitatively.

A further comparison, not entirely objective in character, is given in Table III. Honor-point averages were calculated by allowing 3 points for A, 2 for B, 1 for C, etc. The grades for both groups were obtained in a comparable manner. The same examination was used to obtain college-ability rankings. These latter are given only for students who received a grade in the course. There was elimination in both groups, but it was greater in the evening class. As the instructor of the course said, "One gets in the evening French class some students who hope to learn enough French to enable them, when they visit France, to order a cup of tea by using the French tongue, but when they find they can't learn French with the luxurious ease with which they hope to order the tea, they drop out." The evening student who remains is superior, as both his achievement and his capacity show.

TABLE II

COMPARATIVE ACHIEVEMENT IN HISTORY OF EDUCATION CLASSES

	Average Achievement Score	No. Cases
Group I		
Intra-mural	176.4	182
Extra-mural	182.8	36
Group II		
Intra-mural	162.6	61
Extra-mural	156.7	34
Group III		
Intra-mural	164.7	37
Extra-mural	168.8	48

Table IV presents data for a statistics class. The evening group showed marked intellectual superiority. Its median is above the Q_3 of the entering freshman standards while those of the day classes are about equal to that median. These day classes do not represent the usual selection and are probably not typical.

Two additional extra-mural classes substantiate what appears to be a trend among extra-mural classes toward the higher mental levels. It should be pointed out that evening extra-mural classes are undergraduate; and therefore they should be compared with undergraduate groups as has been done in this discussion. On such a basis the evening groups rank high. There are in the evening groups, as shown by the range, some students who have mental qualifications for even advanced

TABLE III

ACHIEVEMENT AND ABILITY OF INTRA AND EXTRA-MURAL CLASSES IN FRENCH I

Class	Achievement Honor Point	College* Ability P.R.	No. Students
Intra-mural	1.48	71.4	20
Extra-mural	1.76	76.	23

* College ability examination given to Freshmen of S.L.A. College P.R. is in terms of entering Freshmen.

TABLE IV

MENTAL ABILITY OF EVENING AND DAY CLASSES IN STATISTICS

P.R. Intelligence	Evening Fall '28	Day Class Fall '28	Day Class Spring '28
Freshmen S.L.A. Standards	78	47	55
No. of Cases	23	34	22

TABLE V

MENTAL ABILITIES OF EVENING CLASSES IN COMPOSITION, PSYCHOLOGY AND GERMAN

Class	College Ability P.R. Median	Range	No. Students
Composition VI	74	10–99	10
German I	69	4–95	29
General Psychology	59	1–100 plus	144

TABLE VI

COLLEGE ABILITY OF PART-TIME STUDENTS IN GENERAL AND APPLIED PSYCHOLOGY (THESE COURSES ARE USUALLY TAKEN BY SOPHOMORES)

	Deciles*									
	10	20	30	40	50	60	70	80	90	100
Extra-mural	174	201	222	237	259	275	293	312	344	418
Freshmen	167	193	212	229	244	259	275	295	321	381

* Scores on a college ability test used at Minnesota to examine incoming Freshmen.

graduate work. Some of the scores on the college ability test were well in excess of the 100th P.R. for entering freshmen who, according to the psychology of mental tests, have reached their mental maturity, a condition which permits one to say that the mental capacity (not ability) of the best freshman is equal to that of the best graduate students. According to such a premise there are some part-time students who have capacity warranting a rank with the highest in a graduate group.

A comparison of the mental ability of 286 extra-mural students of general and applied psychology with freshman norms is given in Table VI. The lower deciles are closer together than the upper. These data are suggestive of a condition found in a number of classes studied. Although there is no inferiority in any decile of this particular group, it has been found that while the extra-mural classes are equal or superior in mental ability, there is a lowest 10 to 20 per cent which is definitely inferior to the lowest 10 to 20 percent of the full-time groups with which comparisons were made. This condition tends to prevail in both mental ability and achievement. Selection, however, operates speedily to remove this "tail-end." Allowing for the selection it becomes apparent that part-time students add to the quality of the student body.

HIGH-SCHOOL STUDENTS' OPINIONS ON REASONS FOR FAILURE IN HIGH-SCHOOL SUBJECTS

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THE writer has never felt that high-school students were affected by the stigma of failure in school subjects as keenly as many educators feared that they were. The danger of developing an inferiority complex in the student mind has always seemed out of keeping with the writer's experience with the "mental resilience" of the adolescent mind. This study is an attempt to throw a little more light on the question of student reaction to scholastic failure.

A list of possible reasons for failure in school work was submitted to 830 high-school students whose standing varied from freshmen to seniors. This same list was submitted to the teachers of this school; fifty of them responded. The list as presented follows:

"Please give your honest opinion about the reasons why high-school students that you know get 'E's' in their work. Please underline the

word or words which you think tell the truth about the reasons why pupils fail. *Do Not Sign Your Name.*

1. Lack of 'brains.'
   Very important. Important. Helps somewhat. Has nothing to do with it.
2. Common ordinary laziness.
   Very important. Important. Helps somewhat. Has nothing to do with it.
3. Does not like the subject.
   Very important. Important. Helps somewhat. Has nothing to do with it.
4. Does not like the teacher.
   Very important. Important. Helps somewhat. Has nothing to do with it.
5. Hard to study at home.
   Very important. Important. Helps somewhat. Has nothing to do with it.
6. Too many clubs and teams in school.
   Very important. Important. Helps somewhat. Has nothing to do with it.
7. Too many shows and parties outside of school.
   Very important. Important. Helps somewhat. Has nothing to do with it.
8. Too many dates with the $\frac{\text{boy}}{\text{girl}}$ friend.
   Very important. Important. Helps somewhat. Has nothing to do with it.
9. Student is weak or sick.
   Very important. Important. Helps somewhat. Has nothing to do with it.''

The students were asked to rate the importance of each of these reasons. While this list is not to be considered complete, the reasons chosen are among those most commonly offered by students and teachers as explaining failure in school work. The wording was chosen with the view of making the idea clear to the student rather than that of being strictly accurate from the psychological point of view. Thus, the use of the word ''brains'' in question 1, ''laziness'' in question 2, and ''weak or sick'' in question 9 carry definite meaning to the mind of any high-school

student. Whether or not "laziness" is evidence of a mental lack or physical disability, the word carries to the student the idea of ability to deliver the goods if pushed to it. Whether these are true reasons for failure or not is not significant in this study. Whether or not the students' opinions concerning these reasons are actually correct in the absolute sense is of no importance in this study. The significant facts are bound up in the reaction of the student toward his classmate's failure to pass in his work and in his personal explanations for that failure.

The answers were tabulated in the usual manner, the nine reasons being ranked by weighting the four levels of importance as follows:

Very important	0-1	Mid-point of class .5
Important	1-2	Mid-point of class 1.5
Helps somewhat	2-3	Mid-point of class 2.5
Has nothing to do with it	3-4	Mid-point of class 3.5

The mean evaluation for each reason given by each student group (freshmen, sophomore, etc.) and by the teachers was then calculated in the usual manner. The reasons were then ranked in descending order of importance.

Table I gives the ranking assigned each reason by each student group and by the teachers.

TABLE I

	Fresh.	Soph.	Jun.	Sen.	All Boys	All Girls	All	Teachers
1. Lack of brains	8	7	6	8	9	8	8	1
2. Laziness	1	1	1	1	1	1	1	2
3. Dislike for subject	2	3	3	2	2	3	2	6
4. Dislike for teacher	6	8	5	5	8	7	8	9
5. Hard to study at home	4	4	4	4	4	4	4	3
6. Clubs and teams	9	9	9	9	5	9	9	8
7. Shows and parties	7	6	8	7	7	5	5	4
8. Dates	5	5	7	6	6	6	6	7
9. Sickness	3	2	2	3	3	2	3	5

Number of students 830; Number of teachers 50.

Reasons as ranked by students:

1. Laziness.
2. Dislike for subject.
3. Sickness.
4. Hard to study at home.
5. Shows and parties.
6. Dates.
7 and 8. Tie between lack of brains and dislike for teacher.
9. Too many clubs and teams.

Reasons as ranked by teachers:

1. Lack of ability.
2. Laziness.
3. Hard to study at home.
4. Shows and parties.
5. Sickness.
6. Dislike for subject.
7. Dates.
8. Too many clubs and teams.
9. Dislike for teachers.

While there is much agreement in ranking the various reasons, there are several outstanding differences of opinion. The most pronounced of these is the difference on the question of the importance of ability or "brains." This becomes even more striking in the light of the fact that

over 60 percent of the teachers voted lack of brains as being very important while over 50 percent of the students claimed that lack of brains had nothing to do with failure.

Dislike for a thing not infrequently accompanies lack of understanding of it; hence, the fact that the students placed dislike for the subject second only to laziness probably goes hand in hand with the low ranking of mental ability.

It is evident that a large number of students were willing to attribute failure to laziness, dislike for the subject, sickness, etc.; in fact, almost any reason except to admit that they had not the ability to do the work. Whether they were right or not matters little here. The fact remains that from the freshmen to the seniors, despite their own failures and those of their friends, they clung tenaciously to the belief that they could pass if they wanted to and if the "breaks" were not against them.

While individual cases doubtless demand special care with respect to inferiority complexes, the vast majority of high-school students have far too large a measure of the self-confidence of youth to be permanently wrecked or even seriously retarded by so minor a matter as the teacher's estimate of their knowledge of a "book subject." This fact is probably the most important and most hopeful characteristic of youth.

THE CORRELATION BETWEEN SCORES ON OBJECTIVE TESTS IN CHEMISTRY AND TERMAN INTELLIGENCE QUOTIENTS

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DR. POWERS makes the statement in a recent article in which correlations between scores on intelligence tests and various achievement measures in Chemistry are reported,[1] that while considerable evidence has been accumulated to show the agreement existing between measures of mental ability and valid measures of achievement in the elementary or junior high-school subjects, comparatively little information is available to indicate the relationship to ability in Chemistry. The correlations, he reports, are based on standardized Chemistry tests, teachers' marks, and marks on the New York Regents' Examination.

[1] Powers, Samuel R. "The Correlation between Measures of Mental Ability and Measures of Achievement in Chemistry." *School Science and Mathematics*, XXVIII (December, 1928), 981-986.

Additional data have been obtained in a study just completed[2] which indicate the agreement that exists when scores of improvised objective tests in Chemistry are correlated with intelligence quotients obtained with the Terman Group Test of Mental Ability. These findings are here reported, and may serve to supplement the data already at hand.

The Terman Test was given to a group of 230 pupils, and as approximately three-fourths of the pupils were classified as eleventh-year pupils, a relative comparison with Terman norms is possible. Terman upper quartile, median, and lower quartile scores for eleventh-year pupils are respectively 163, 138, and 112; the average scores obtained for the 230 pupils involved in this study were 163, 141, and 118. While the two sets of scores are apparently in close agreement, we must remember that where Terman norms are based on unselected groups of eleventh-year pupils, the norms for this study are based on the scores of pupils enrolled in Chemistry alone. The intelligence of the group, therefore, does not appear to be much higher than we should normally expect. The IQ's of pupils involved in this study ranged from 81 to 127 with a median of 103. These scores are substantially lower than medians reported by Powers for groups of approximately the same size.

TABLE I

THE NUMBER OF ITEMS FOR EACH TEST AND THE SCOPE OF THE TESTING PROGRAM AS INDICATED BY THE SUBJECT-HEADINGS OF THE TESTS

No. of Test	Subject of Test	No. of Items
1.	Inventory Test (before instruction)	100
2.	Elements, Mixtures, Compounds, etc.	25
3.	Oxygen	25
4.	Gas Problems	10
5.	Hydrogen	20
6.	Water and Solution	25
7.	Problems and Calculations	10
8.	Acids, Bases and Salts; Valence; Nomenclature	100
9.	Chemical Terms and Formulas	25
10.	Formulas and Common Names	25
11.	Chemical Terms and Common Names	25
12.	Equation-Balancing	25
13.	Inventory Test (after one Semester of study)	100
14.	Normal Solutions: Titration	10
15.	Sodium; Solvay Process	50
16.	Baking Powders	20
17.	Soaps	15
18.	Calcium Compounds	50
19.	Air; Atmosphere	25
20.	Ammonia	50
21.	Nitric Acid	10
22.	Periodic Law	10
23.	Inventory Test (after two semesters)	100
		855
	(Inventory Test items duplicated)	200
	Total	655

[2] Unpublished Master's Thesis, University of Wisconsin, 1929.

In the study herein reported a series of twenty-three objective tests, comprising 655 items based upon the various types of subject-matter commonly covered in a high-school chemistry course, were administered to 230 pupils over a period of three consecutive semesters. The general nature of the tests, and the scope of the testing program are indicated in Table I.

The reliabilities of the above tests were determined by breaking the forms into 'chance-halves,' correlating the half-scores, and applying the Spearman-Brown prophecy formula. To measure group performance rather consistently, tests should yield reliability coefficients around .70; coefficients reported for a number of the tests (Tests 2, 5, 9, 14, 15, 19, 20 and 23) are considerably below this figure, and must be discounted in the interpretation of subsequent findings. Data relative to the reliability of the separate tests are given in Table II.

TABLE II

NUMBERS OF PUPILS TAKING THE TESTS, THE STANDARD DEVIATIONS OF THE TESTS, CORRELATIONS OF THE HALF-TESTS, AND RELIABILITY COEFFICIENTS

No. of Test	No. of Pupils	S.D.	r.	$r_{\frac{1}{2}\frac{1}{2}}$	No. of Test	No. of Pupils	S.D.	r.	$r_{\frac{1}{2}\frac{1}{2}}$
1	128	11.90	.64	.78	13	165	18.90	.53	.69
2	127	13.64	.35	.52	14	90	16.67	.323	.47
3	126	16.15	.634	.769	15	85	21.78	.336	.503
4	126	31.40	.708	.829	16	87	18.38	.643	.782
5	128	17.02	.463	.632	17	90	16.61	.555	.714
6	121	16.18	.586	.738	18	88	12.96	.524	.687
7	123	24.43	.68	.809	19	90	11.04	.200	.333
8	124	16.00	.81	.89	20	85	20.30	.417	.588
9	120	10.50	.488	.656	21	87	17.54	.809	.89
10	119	22.49	.71	.83	22	88	12.04	.91	.95
11	121	19.80	.84	.91	23	80	20.60	.288	.447
12	116	25.60	.775	.87					
						2514			

Before examining the results obtained through the correlation of objective test scores with Terman IQ's, it will be of interest for comparative purposes, to note the results obtained by Powers in the study already referred to, and the data reported by Wolf[3] in another study.

Correlations between intelligence and marks made by different groups on standardized chemistry tests, the New York Regents' Examination and Teachers' marks, as reported by Powers, are given in the following table.

[3] Wolf, Milton G. "The Relation Between the Degree of Intelligence and Success in the Study of Chemistry." *Journal of Chemical Education*, V (January, 1928), 76-83.

The following extracts taken from the Powers' study illustrate quite clearly what significance may be attached to these findings:

TABLE III

CORRELATIONS BETWEEN INTELLIGENCE AND CHEMISTRY MARKS (TAKEN FROM POWERS' TABLES I, II, III, AND IV)

	N	Powers Test	Gerry Test	Teachers' Marks	Regents
Otis Test scores	50	.399 ± .08	.35 ± .08	.03 ± .095	
Terman Test scores	36	.41 ± .09	.38 ± .09		
Terman Test scores	40–53	.26 ± .099			.44 ± .085
Terman IQ's		.32 ± .095			
Terman IQ's	222	.31 ± .06			
Cleveland Test*	222	.46 ± .04			
Otis Group Test*	193	.67 ± .03			

* Measures of mental ability for the Cleveland and the Otis Tests used were respectively The Probable Learning Rate (P.L.R.) and the Index of Brightness (I.B.); these two measures correspond approximately with the IQ.

"The data of these tables seem to suggest that there is but little relationship between measures of mental ability and of achievement obtained from the use of these tests."

"All the correlations are positive but they are low. We may conclude from this that intelligence as measured by the tests is a factor of success but within the range of ability of these students it is not a very important one. It is, indeed, likely that it is not as large a factor in successful attainment of marks as it should be."

The only coefficient which stands out from the others is that reported for 193 pupils taking the Otis Group Test (Table III); these pupils were high-school juniors with a relatively high median intelligence level (I.B. 120.4). Powers suggests that the achievement test may have been a less valid measure for this group.

Wolf reports correlations between Terman Test scores and pupil performance on two standardized chemistry tests, 'instructors' marks and the Regents' Examination, based on one hundred eighty-nine cases, which are given in Table IV. Pupils concerned are twelfth-year pupils of superior mental ability.

TABLE IV

CORRELATIONS BETWEEN TERMAN TEST SCORES AND ACHIEVEMENT SCORES IN CHEMISTRY

	Powers Test	Rich Test	Instructors' Marks	Regents' Exam.	Composite
Terman Test Scores	.45 ± .04	.49 ± .04	.26 ± .05	.31 ± .04	.48 ± .04

While the coefficients obtained in this study vary somewhat from those reported by Powers, they are all comparatively low, and Wolf concludes that, "A pupil's general intelligence as indicated by the Terman Test is

far from a certain indication of his future success, as judged by any of the four standards here set up."

Results obtained by correlating the scores made by pupils on improvised objective tests in chemistry with Terman IQ's, reported in Table V, apparently are substantially in agreement with those reported for standardized tests and other achievement measures, given in Tables III and IV. Positive correlations are found for all tests, but they are very low.

TABLE V

CORRELATIONS BETWEEN TERMAN IQ'S AND SCORES ON IMPROVISED OBJECTIVE CHEMISTRY TESTS

No. of Test	r		No. of Test	r	
1	.302	.05	13	.446	.04
2	.308	.05	14	.357	.06
3	.492	.04	15	.525	.05
4	.512	.04	16	.397	.06
5	.333	.05	17	.376	.06
6	.435	.05	18	.205	.07
7	.382	.05	19	.320	.06
8	.420	.05	20	.355	.06
9	.280	.06	21	.105	.07
10	.303	.06	22	.202	.07
11	.318	.05	23	.411	.06
12	.426	.05			

In an article written some years ago, Breed[4] says, "A great number of coefficients of correlation between intelligence and achievement scores have been published, many of which are of doubtful value particularly on account of the unreliability of the data representing educational achievement. The coefficients range all the way from very low to very high, and the more dependable ones seem to cluster somewhere between .40 and .60." Later, in the same article, he suggests that the teacher should "endeavor to secure achievement of pupils according to intelligence."

The lack of agreement between ability and accomplishment in Chemistry, as indicated by the correlation coefficients presented, must to some extent be attributed to the fact that our measures of ability and achievement are still far from being perfectly reliable, and to our inability to take into consideration the influence of qualifying factors having a tendency to attenuate results, i.e., health, interests, habits and distractions of pupils. The greatest single factor tending to reduce the size of the coefficient, however, is undoubtedly our failure to make adequate pro-

[4] Breed, Frederick S. "Shall We Classify Pupils by Intelligence Tests?" *School and Society*, XV (April, 1922), 406-409.

vision for the varying needs of pupils in our classes. This is well stated in the following extract from the Powers' study, "But students of mental ability approximating that of the median are about as likely to score well on the achievement tests as are the students of superior mental ability. This suggests that class progress is set to the median ability and that superior students are not stimulated to use their talent. This is a likely hypothesis and if it is true, improvement of accomplishment from superior students will result from adaptation of instruction to the individual differences of the class. Specifically we should set higher standards for those of the class who are shown by the tests to have superior ability and demand the accomplishment of these standards."

With more reliable achievement tests, perfectly objective scoring methods, and through a modification or reorganization of teaching procedures and subject-matter content so as to satisfy the needs of pupils of varying learning capacities, we may quite safely predict higher values of correlation than we are obtaining at present.

ERRATA

An error in the December issue (1930) of the JOURNAL OF EDUCATIONAL RESEARCH has just been reported to us. In the Shorter Article "A Further Study of the Validity of a Test of Social Intelligence" by M. E. Broom—page 405, Table III—*the lower quadrants should be interchanged.*

EDITORIALS

THE COEFFICIENT OF CORRELATION

Spearman, in a critical discussion of general intelligence, in 1904[1] enumerated four shortcomings in the statistical procedures employed by the experimental psychologists of his day: (1) failure to use a *precise quantitative expression* (such as the coefficient of correlation) to represent the amount of agreement between test results; (2) failure to calculate the *probable error* of the coefficient of correlation; hence no means of judging how much of the results are due to *accidental coincidence;* (3) failure to consider *irrelevant and falsifying factors* which may give misleading correlations which are too high or too low; and (4) failure to allow for *errors of observation.* Thirty years of experimental education and psychology have seen much progress in the development of intelligent producers and consumers of statistical materials. The tabular means of comparison employed prior to Wissler's[2] investigation of 1901 have in these thirty years been replaced by precise methods of correlation. The average statistical worker and reader of research literature is to-day familiar with simple correlation techniques. Some understand multiple and partial correlation. While the probable error of the coefficient of correlation has no *real* meaning to many readers of research literature, the published reports of correlation studies usually contain these facts for the benefit of their readers. A few investigators employ formulas for correcting correlation coefficients for response errors (or for "attenuation," as Spearman called it). In general, however, in spite of the great advance that has been made in the application of correlation methods to the measurements of relationship during the thirty years that have elapsed since Spearman made his statement relative to the statistical practices of his day, there seems to the writer to be many misunderstandings, misinterpretations, and misapplications of correlation techniques against which lay workers and readers of research literature need to be warned if they are not to be grossly misled in the study of education. It is the purpose of this editorial to discuss certain of these misunderstandings, misinterpretations, and misapplications of the coefficient of correlation.

[1] Spearman, C. "General Intelligence Objectively Determined and Measured," *American Journal of Psychology,* XV (April, 1904), 201-292.

[2] Wissler, Clark. *Correlation of Mental and Physical Tests.* Psychological Review Monograph, III, 1901.

There are five sorts of error that enter into the calculation and use of coefficients of correlation: (1) computational errors, errors in addition, subtraction, etc.; (2) errors due to random sampling fluctuations, such as are measured by the various error formulas, σ, P.E., etc.[3]; (3) errors growing out of the failure of statistical workers to observe the assumptions and restrictions placed upon the use of statistical formulas;[4] (4) errors of incomplete analysis growing out of the failure of statistical workers to employ more refined statistical procedures, where such are necessary, such as correction for attenuation, grouping, spread of data, and non-linearity of regression; and (5) errors of interpretation. The errors of interpretation grow partly out of misconceptions about items 2, 3, and 4 above, and partly out of misconceptions of the meaning of the coefficient of correlation itself. The writer wishes in this editorial to discuss only certain of the above named sources of error in coefficients of correlation, namely, those of interpretation. And again, of the many errors of interpretation he has chosen three: (a) errors in estimating the amount of relationship between traits represented by coefficients of correlation of different sizes; (b) errors growing out of the assumption of casual relationship from obtained coefficients of correlation; and (c) errors due to the acceptance of coefficients of correlation at *face value*.

In the first place, there is no adequate understanding among lay workers and consumers of research literature of the amount of relationship between traits represented by coefficients of correlation of different sizes. The most common interpretation of the coefficient of correlation is that of a decimal fraction or percent. This interpretation is misleading, since the intensity of association does not vary directly with the size of the coefficient of correlation.[5] While it is beyond the scope of this editorial to enter into a discussion of the meaning of the coefficient of correlation, there are two interpretations with which the consumers of research literature should be familiar:[6] (1) the coefficient of correlation as an indication of the proportion of common elements in two

[3] Holzinger, Karl J. *Statistical Methods for Students of Education* (Boston: Ginn and Company, 1928), pp. 231-250.

[4] The obtained coefficient of correlation supplies a single quantitative expression for the amount of agreement between the fluctuations of two sets of data. It enables one to determine the amount of improvement made by using the equation of regression to estimate y in terms of x in place of merely using the average of the y's. The calculation of the coefficient of correlation is made by the use of certain statistical formulas and gives one a means of finding the true coefficient of correlation for the whole population only when certain assumptions concerning the nature of the sample are fulfilled. When one must make other assumptions, as one almost always does, in the application of correlation techniques to educational problems, he introduces possibilities of error and misinterpretation.

[5] Holzinger, Karl J. *Statistical Methods for Students in Education* (Boston: Ginn and Company, 1928), pp. 163-167.

[6] Garrett, Henry E. *Statistics in Psychology and Education* (New York: Longmans, Green and Company, 1926), pp. 288-299.

variables,[7] and (2) the coefficient of correlation as an aid to the determination of the percentage of improvement in prediction.[8] This latter interpretation has assumed four specific forms: (a) the percentage of general improvement in forecasting efficiency;[9] (b) the error in estimating one variable from another;[10] (c) the percentage of cases varying from perfect correlation in multiple amounts of sigma;[11] and (d) the determination of errors of measurement (the probable divergence of an individual's obtained score from his corresponding true score, when the σ and the reliability of the test are known.)[12]

Secondly, the coefficient of correlation is frequently erroneously interpreted as a measure of casual relationship. The coefficient of correlation is a mathematical expression of the degree of association between two variables, and not a measure of causal relationship. Tschuprow[13] tells of the statistician who concluded, from a study of the relationship between the size of the fire machinery sent to fires and the amount of losses from these fires, that small machines did less damage than large ones. The erroneousness of this interpretation is obvious, but there are many instances in educational investigations in which the erroneous interpretation is not so obvious, but in which the interpretation is equally absurd. The literature of education contains numerous correlation studies of the factors constituting or conditioning different products and abilities, such as the studies of teaching ability, causes of absence from school, analytical studies of arithmetical ability, etc., in which it is difficult to know which factor is the cause, and which the effect or that the obtained correlation is not due to a common factor, or to coincidence. The coefficient of correlation merely gives one a kind of average of the agreement between the fluctuations of two sets of data. It will be found useful in the exploratory stages of an enquiry (preliminary to an experimental study in which the effects of the various factors are studied under controlled conditions) to discover those factors that appear to be associated;[14] or in the study of phenomena where it is impossible to

[7] Brown, William. *Essentials of Mental Measurement* (Cambridge, England: Cambridge University Press, 1911), pp. 78-80.
Brown, William, and Thomson, G. *Essentials of Mental Measurement.* London, England: Cambridge University Press, 1921.

[8] Kelley, Truman L. *Statistical Method* (New York: The Macmillan Company, 1924), pp. 173-175.

[9] Hull, Clark L. *Aptitude Testing* (Yonkers-on-Hudson, New York: World Book Company, 1928), pp. 273-276.

[10] Rietz, H. L., et al. *Handbook of Mathematical Statistics* (Boston: Houghton Mifflin Company, 1924), pp. 126-129.

[11] Lincoln, Edward A. "The Interpretation of Correlation Coefficients in Terms of Departure from Perfect Correlation," *Journal of Educational Psychology,* XXI (April, 1930), 284-285.

[12] Garrett, Henry E. *Statistics in Psychology and Education* (New York: Longmans, Green and Company, 1926), pp. 274-277.

[13] Tschuprow, A. A. *Grundbegriffe und Grundprobleme der Korrelationstheorie.* Leipzig, Germany: Teubner, 1925.

[14] Fisher, R. A. *Statistical Methods for Research Workers* (Second Edition, revised and enlarged. Edinburgh: Oliver and Boyd, 1928), pp. 140-175.

control the various contributory factors. Inferences of causal relationships should not, however, be made from the coefficient of correlation.

Finally, there are errors of interpretation due to the acceptance of coefficients of correlation at *face value*. These errors of interpretation grow partly out of the failure of statistical workers to employ more refined statistical procedures, where such are necessary, such as, correction for attenuation, grouping, spread of data, and non-linearity of regression, and partly out of the failure of statistical workers to give adequate consideration, in the interpretation of obtained coefficients of correlation, to the assumptions and restrictions imposed upon the formulas employed in statistical calculations. Because of these variations in statistical practice, and because of the failure of many statistical workers to observe the restrictions imposed upon the formulas used in statistical calculations, the lay reader is cautioned against the acceptance of obtained coefficients of correlation at face value. The size of obtained coefficients of correlation seldom represents the intrinsic relationship between variables:[15] (1) Because of the failure of many statistical workers to correct coefficients of correlation for attenuation, response errors, or errors of measurements.[16] The instruments of measurement used in collecting data are fallible. The unreliability of data gathering devices operates to lower the obtained coefficients of correlation. Coefficients of correlation that have not been corrected for attenuation fail to represent the intrinsic relationship between two traits. (2) Because of the failure of statistical workers to examine their data for linearity of regression. A regression is said to be linear when the means of the arrays in a correlation table lie close to a straight line. Simple coefficients of correlation obtained by the product-moment method from non-linear regressions always understate the amount of functional relationship between the traits studied.[17] (3) Because of the failure of statistical workers to apply correction formulas for grouping. The grouping of data tends, except in cases where the frequency distribution is a histogram (which it rarely or never is), to increase the standard deviation and consequently to reduce the size of the coefficient of correlation. While this correction is normally small and unimportant for single samples, it becomes important in the averaging of the coefficients from a number of coarsely grouped small samples.[18] (4) Because of the

[15] The coefficient of correlation may be used for either one of two purposes, namely, (a) as an index of the degree of relationship between two or more traits, or (b) for purposes of prediction. The shortcomings in present statistical practices are here discussed from the standpoint of the use of the coefficient of correlation as an index of the amount of relationship that exists between two or more traits.

[16] Kelley, Truman L. *Statistical Method* (New York: The Macmillan Company, 1924), pp. 204-205.

[17] Holzinger, Karl J. *Statistical Methods for Students in Education* (Boston: Ginn and Company, 1928), pp. 177-189.

[18] Yule, G. Udny. *An Introduction to the Theory of Statistics* (Eighth Edition, Revised. London: Charles Griffin and Company, Limited, 1927), pp. 211-212.

failure of statistical workers to consider the spread of data from which coefficients of correlation are calculated (the spread of the sample with reference to the population from which it is chosen). The size of a coefficient of correlation calculated between two traits for one range of talent will be different from a coefficient of correlation between the same traits from different ranges of talent. While this fact has been frequently applied to the determination of the reliability of tests,[19] it merits more general application. (5) Because of the failure of statistical workers to consider selective factors that may operate in the choosing of samples. Sampling errors are of two sorts: (a) sampling errors due to the limited size of the sample (measured by various error formulas, σ, P.E., etc.); (b) sampling errors due to the failure to secure a random sample. The errors here considered are of the second sort.[20] A coefficient of correlation, for example, between two traits determined from the measurement of pupils chosen from a single school grade may be biased due to sampling errors of the second sort, if one desires to know the amount of relationship that exists between these traits in a more general population. The randomness of the samples employed in statistical calculation need always to be considered in relation to the population that one desires to sample. (6) Because of the failure of statistical workers to consider irrelevant factors, such as age, race, sex, practice, etc. The obtained coefficient of correlation between two variables, such as problem solving and manipulative skill in arithmetic, for example, may not at all represent the true relationship between these variables, but a spurious correlation traceable to a common factor, such as intelligence. Three methods have been developed for the consideration of these factors: (a) the calculation of coefficients of correlations only from homogeneous groups;[21] (b) the employment of the partial correlation technique;[22] and (c) the calculation of coefficients of correlation between variables in which the deviations are taken from the means of homogeneous sub-groups rather than from the mean of the entire population.[23] It is ordinarily necessary to employ these more advanced correlation techniques if one is to derive a true picture of the intrinsic relationship between variables.

The writer should like in this connection to call special attention to the effect of practice upon test results and its consequent effect upon the size of the coefficient of correlation.[24] Spearman discussed the irrelevancies

[19] Kelley, Truman L. *Statistical Method.* (New York: The Macmillan Company, 1924), pp. 221-223.

[20] Rietz, Henry L. *Mathematical Statistics.* (Chicago: The Open Court Publishing Company, 1927), pp. 114-116.

[21] Kelley, Truman L. *Crossroads in the Mind of Man.*

[22] Yule, G. Udny. *An Introduction to the Theory of Statistics.* (London: Charles Griffin and Company, Limited, 1927), pp. 229-253.

[23] May, Mark A. "A Method for Correcting Coefficients of Correlations for Heterogeneity in the Data," *Journal of Educational Psychology,* XX (September, 1929), 417-423.

[24] Hollingworth, H. L. "Correlation of Abilities as Affected by Practice," *The Journal of Educational Psychology,* IV (September, 1913), pp. 405-414.

of practice as they relate to the study of intelligence in his article of 1904.[25] In many educational investigations the factor of practice is an important one, since the individuals comprising the sample studied are heterogeneous with reference to the factor of practice, each having been selected from a different point on the learning curve. This factor is of such importance and of such general application that the correlation values that one finds in the literature of education are subject to gross misinterpretation. Because of the facts here referred to, it will be difficult for consumers of research literature to attach any special significance to the amount of relationship reported in correlation studies.

The shortcomings in the use of the coefficient of correlation described above have been known to expert statisticians, in many instances, for many years. This editorial is not directed to the expert statistician. There are, however, many lay workers and consumers of statistical research who are not expert statisticians and who have not developed an adequate conception of the meaning and use of the coefficient of correlation. These individuals—teachers, principals, supervisors, and superintendents—are the determiners of the policies and practices of the schools of this country. It has been said somewhere that a little information is dangerous. The plea of this editorial is for a better understanding of the coefficient of correlation and greater caution in its use among lay workers and the consumers of statistical research.

A. S. Barr

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[25] Spearman, C. "General Intelligence Objectively Determined and Measured," *American Journal of Psychology*, XV (April, 1904), 201-292.

REVIEWS

Address all communications relative to book reviews to Editor E. J. Ashbaugh, Miami University, Oxford, Ohio.

BROOKS, FOWLER D. *Psychology of Adolescence.* New York City: Houghton Mifflin Company, 1929. xxiii + 652 pp.

The psychological phenomena of adolescence constitute the most challenging period of child life. From the exaggerated statements of a few years ago concerning the sudden onset of the reasoning ability, the sudden onset of emotional life, and suddenness in appearance of much other mental phenomena, knowledge has moved on to a new position. This change in attitude has been brought about by means of information which has slowly accumulated as a result of much industry in this direction. There are hardly a handful of informed persons who put any great faith in the supposed saltatory antics of mental traits at this period, and adolescent life has become a well explored mental territory.

It is the accumulation of studies worked out by a thousand investigators which makes possible such a text as the one before us. Dr. Brooks has examined the most of them very carefully. References both at the foot of the pages and at the end of the chapters as well as the fifty-eight tables and eighty-four figures attest the heavy obligation the author is under to scientific studies. This is as it should be. The psychology of adolescence needs well attested facts. With respect to all of that, one might still say that a little too much raw material has been introduced into the present volume.

Questions of physical, mental, and emotional growth are considered. Critical discussion of the nature of mental growth appears in one of the most interesting chapters. It is shown that the yearly measurements of the same children do not constitute adequate measures of mental growth, because the unit of measure is based on mental age, a year of which at five years is not different from one at ten. This fact makes it impossible to discover whether intelligence grows more or less rapidly during adolescence than before. There is a chapter on the emotional life. It treats of the nature of emotion, its connection with the autonomic nervous system and other physiological changes, and of the new emotions at adolescence. All the facts are presented in a logical order, but the chapter is not convincing. Granted that the methods of measuring emotions have been adequately discussed, that the methods for the control of the emotions are listed carefully, that many other needed facts are detailed, yet there is a failure to interpret the sex life satisfactorily. There is no discussion of the important change in the student from the homosexual to the heterosexual attitude. There is little said about the more frothy type of adolescent behavior, its day dreams, and its alternation between periods of unhappiness and extreme joy. One misses the psychological insight which one finds in Hollingworth's book on the same subject. The

latter's chapter on "psychological weaning" surpasses the treatment of emotions in the present book.

On the other hand, wherever the facts have been gathered, the present volume is excellent. It far surpasses the Hollingworth volume in the treatment of adolescent interests. This chapter is full of pertinent information. There is adequate treatment of adolescent personality, of personality disturbances, and of the hygiene of adolescence.

This volume is a distinct contribution to the literature of the subject. Its factual material is characterized by richness and extensiveness. Its bibliographies leave nothing to be desired. One weakness appears. The treatment of the emotional life of the adolescent has been too little influenced by the modern psychiatric findings and interpretations.

A. M. JORDAN
University of North Carolina

BROOKS, FOWLER D. *Psychology of Adolescence.* New York City: Houghton Mifflin Company, 1929. xxiii + 652 pp.

This is a long, and in parts a wearisome, book on a field in which only a few facts are yet established. It is definitely written for use as a textbook, and is very inclusive so far as topics on everything from the adolescent's physical growth, motor capacities, intercorrelations of capacities, etc., to his religious and moral reactions are concerned. But the treatment of the topics heading the eighteen chapters and the numerous divisions and sub-divisions are of necessity very brief and unanalytic. Little attention is paid to the reliability and the validity of the data and graphs in the 58 tables and the 84 figures. The author rightly deplores the absence of reliable data on many topics considered. In the cases of data offered, no adequate consideration is to be found of such selective conditions as the superiority of the children of the younger ages and the dullness of those of the older ages in the public schools on whom the group tests were made. The non-critical reader will accept all data as 'facts.' And what will he do with them? They may possibly give the more intelligent student a general impression of certain principles of growth through adolescence. For this purpose useful summaries are given.

Most of the data come in the early part of the book where physical and mental growth is considered. Little evidence of correlations among motor capacities exists, and mentality cannot be predicted from physical tests (as Wissler found in 1901). Neither the exact period, nor the manner, of cessation of mental growth is yet well established, and there is little evidence to uphold the view that duller children mature earlier than brighter ones. It is admitted that increases in test scores do not accurately reveal the nature of mental growth. Norms of such increase are valuable mainly for comparative purposes within each year. The coefficient of variability in mental growth decreases with age. Brooks bases certain arguments on range of variation but this measure is, of course, of little value. Instincts and impulses, emotions, interests, etc., receive mainly verbal and theoretical treatment of a half-modern nature. The best recent contributions to neurophysiology, to modes of stimulation, to learning, etc., show no influence on the book. The author follows Thorndike's old 'laws of learning' with the usual emphasis on frequency, apparently ignorant that even Thorndike has now found results which are sure to modify his educational doctrine. The greater part of

the last three-fourths of the book is the usual theorizing that one gets on adolescence, but with a more modern conception of personality. The author's opinion on questions of personality adjustments in adolescence, on moral and religious growth and adjustment, etc., is sounder than were the views expressed in older literature.

Numerous references and problems for discussion (the latter usually of a too general nature) are given at the ends of the several chapters.

Peabody College JOSEPH PETERSON

O'SHEA, HARRIET EASTABROOKS. *A Study of the Effect of the Interest of a Passage on Learning Vocabulary.* New York: Teachers College, Columbia University, 1930. 122 pp.

This book reports a careful study of the problem of interest and its relation to the learning of vocabulary found in some specially selected passages of books of varying degrees of interest. The study was made at Madison, Wisconsin, in the 5th, 6th, 7th, and 8th grades of the public schools.

The experimenter selected books which were of interest to boys, and some which were of interest to girls, as determined by Jordan, in his study "Children's Interest in Reading." From these books Dr. O'Shea took passages which were thought to be of greatest interest to the members of each sex, and had them reprinted in special four-page booklets. In addition, passages from "an uninteresting book" were chosen, to be used as a check on the other materials.

From these passages Dr. O'Shea formulated objective vocabulary tests, containing "the hard words in the passages." (This study was done previous to the appearance of the Thorndike word list, but the author claims a high degree of relationship between her list and that of Thorndike's, so far as the validity of the difficult words is concerned.)

The experiment itself consisted in dividing the four grades of pupils into two groups, the 5th and 6th grades in the first group and the 7th and 8th in the second group, with provision for control groups. All of the children were given two forms of the National Intelligence scale, and Monroe's Reading test, and then the pre-test on the words selected from the passages to be read. Each day thereafter, each pupil read one passage, taking for it as much time as was needed. When all the reading was completed, the pupils evaluated the passages read in terms of interest for them, and placed each passage in one of the three classes, "Best," "Neutral" or "Least" interesting. The vocabulary tests were then given again, and in addition Thorndike's Visual Vocabulary scale was given to the pupils. The whole experimental program consumed five weeks.

The statistical treatment of the data involves many correlations, and some other devices for indicating the interrelationships of the different measures obtained. It is impossible to present here the statistical findings, for they were too numerous. It is not possible even to present all the summary statements and conclusions at which the author arrived. The author does, however, indicate two general statements, among others, which are particularly interesting. First, she asserts that mild interest is more favorable to vocabulary improvement than either great or little interest in the material read, and second, that the most powerful ally in learning is the bona fide interest of the learner in the activity in which he is engaging. Dr.

O'Shea recognizes the fact that her data is not complete, and devotes considerable space to indicating certain weaknesses of the study and some changes which might have brought about differing results.

The primary value of the work, from the point of view of the reviewer, is the number of problems which Dr. O'Shea has indicated have grown out of her work, and the suggestions which she makes with reference to the probable relations between such factors as intelligence and interest, the amount of interest and the extent of learning vocabulary, sex differences for different reading materials, etc.

In addition to the main body of the study, the author has presented a very good summary of the history and present status of the problem of interest and effort from the standpoint of the educator, and incidentally has taken the psychologist to task for failing to tackle this problem experimentally. A complete bibliography is also given which would be helpful for anyone interested in the general topic under discussion.

The experiment, although lacking proper objectivity in certain aspects, and with the obvious inability to control sufficiently the variable factors influencing the results, is a distinct contribution to this neglected field of experimental work, and the book should be read by any person who attempts to treat the problem of interest and effort either theoretically or practically, in the classroom.

BERT A. NASH
University of Kansas

CONGDON, A. R. *Training in High-School Mathematics Essential for Success in Certain College Subjects.* New York: Teachers College, Columbia University, 1930. ix + 102 pp.

It is difficult to review this study without first substituting the words "college physics" for "certain college subjects" in the title, since practically all of the data used were taken from O. M. Stewart's *Physics, A Textbook for Colleges.* Only a few of the items were taken from one other college subject, namely, chemistry. The analysis involved in the study is four-phase, covering (a) mathematical vocabulary, (b) symbolism, (c) facts, concepts, and skills, and (d) general processes and methods of procedure (in solving problems). In addition, "eighteen problems representing the various skills involved were selected and arranged to form a test." These were given to 859 high-school pupils and the results used, apparently, to prove that some of the algebraic manipulations were "unusual or different," and therefore more difficult than others. It is difficult to see just what contribution this knowledge makes to the subject involved, or to education in general. Comments and conclusions based on the first three phases of the analysis are made apparently from general educational experiences rather than from educational experimentation.

The real contribution in this study, as the writer sees it, is the formulation of a list of general processes and procedures involved in the problems. Dr. Congdon is undoubtedly right in stressing the value of training in methods of procedure as against mere acquisition of facts, concepts, and skills. One can scarcely help but feel, however, that as a research study his contribution would have been greater had he offered some objective data to show just what ones of his list of processes and procedures (assuming his is a reliable list) need stressing the most in high-school training in mathematics, and had shown, through actual

application of drill in carrying on these processes and procedures, that success in certain college subjects may be more readily attained.

W. K. WILSON
University of the State of New York

FISHER, V. E. *An Introduction to Abnormal Psychology.* New York: Macmillan Co., 1929. x + 512 pp.

Following a brief delineation of the normal individual and of conscious, subconscious, and unconscious processes, the author discusses in detail the mental mechanisms employed in responding to difficulties (trial and error reactions, persistent nonadjustive reactions, regressions, compensations, inhibitions, repressions, and dissociations), the various "psycho-neuroses," (neurasthenia, psychasthenia, hysteria and multiple personality, and the sexual neuroses), and three so-called functional psychoses (the manic depressive, paranoia, and dementia praecox). The book closes with a brief treatment of sleeping, dreaming, hypnotism, and feeble-mindedness, and contains a brief but excellent glossary of technical terms used in abnormal psychology.

While thoroughly saturated with the psychoanalytic point of view and psychoanalytic concepts, the book is critical of psychoanalysis to the point where it will not satisfy many of the psychoanalysts. On the other hand, many of the more conservative psychopathologists and clinical psychologists will feel that the book should have, at least, included references to many of the outstanding books in clinical and abnormal psychology, psychiatry, and mental retardation and deficiency which attack other phases of the subject matter or the same problems from other viewpoints.

In spite of such limitations, the book constitutes an excellent introduction to the subject matter which it treats, although its use as a text may have to be restricted to more mature students because of its frank treatment of some of the problems of sex. While objections will doubtless be found with many specific conclusions and statements, the author is to be congratulated upon having produced a thoroughly readable, well-digested, and critical treatment of many of the important topics in the field of mental and nervous pathology and abnormal psychology, which gives due weight both to the social and environmental and to the hereditary factors.

J. E. WALLACE WALLIN
Atlantic University

SWIFT, FLETCHER HARPER, AND ZIMMERMAN, BRUCE LEWIS. *State School Taxes and School Funds and Their Apportionment,* Bureau of Education, Bulletin No. 29, 1929.

For a number of years school administrators have realized that gross educational inequalities exist in the United States, not only as between the various commonwealths but within each state as well. Much of the existing inequality is due to the disparity among taxing units in ability to support public education. The acuteness of the problem calls for careful study of the situation, involving the principles governing the extent to which the state should contribute to the support of public education and the principles governing the manner of distribution of such state funds. All this involves the larger problem of our whole scheme of taxation, especially since ability to pay is made a criterion for the apportionment of state funds for educational purposes.

A first approach fundamental to the whole problem is that of accurate sum-

marized knowledge of the present status of state support and the methods of apportionment employed in the various states. The starting point for any study of the problem must be an understanding of the existing practices and policies in the matter of types of taxes levied by the various states and in the matter of the manner in which such receipts are apportioned for public school purposes.

The authors of the study under consideration have made a distinct and notable contribution to the literature in this field in their summary of existing practices and policies in the forty-eight states. For each state the sources of the funds devoted to state support of public education are given, as well as the amounts of such funds and the manner of distribution of the same. Special interest attaches to the marked trend toward a greater measure of state support for public education, particularly to the trend toward the principle of equalization of the financial burden of public education. The study is of great value to the general reader in educational administration, but it is of even greater value to those whose major interests lie in the field of equalization of educational opportunity. This is another of a long list of outstanding contributions in the field of public school finance that have come from Fletcher Harper Swift.

JOHN GUY FOWLKES
University of Wisconsin

ROSE, MARY SWARTZ, AND GRAY, CORA E. *The Relation of Diet to Health and Growth of Children in Institutions.* New York: Columbia University, 1930. vii + 128 pp.

The authors describe studies made of dietaries in four child-caring institutions with consideration of the health and growth of the children who were inmates. The dietaries were analyzed by food groups which indicate calories furnished by foods from six groups, each of which make certain typical contributions: (1) foods from cereal grains; (2) milk; (3) legumes, nuts, etc., also other vegetables and fruits; (4) fats and oils; (5) sugars and sweets; (6) eggs, meats, fish and other flesh foods. The advantages in approaching the problem through this method which shows the percent of total calories furnished by each group are noteworthy. "No study of menus alone will give any idea of the adequacy of dietaries." Nevertheless, the surveys made in these studies show that the physical progress of the children varied according to the excellencies of their diet.

A great merit of the book is its precision in points of detail. It gives minute directions for those interested in judging dietaries and standards which affect health. The appendix gives specific analysis of menus, the foods used in the dietaries studied, and the energy requirements of the children concerned, together with exact height and weight records in each of the institutions. A comprehensive, up-to-date bibliography makes available titles of books which refer to allied data and other similar studies. Ten pages are given to "practical application of the method of apportioning food by distribution of calories among typical food groups." These pages would serve as a guide to persons concerned with the selection of proper food material and the quota necessary for satisfaction and continuous growth. A three-weeks dietary with market orders and comments, made in the light of the newer knowledge, leaves the reader with information and plans which can be

easily applied in most child-caring institutions.

NORMA SELBERT
Ohio State University

ODUM, HOWARD W., AND JOCHER, KATHARINE. *An Introduction to Social Research*. New York: Henry Holt and Company, 1929. xiv + 488 pp.

LUNDBERG, GEORGE A. *Social Research*. New York: Longmans, Green & Co., 1929. xi + 380 pp.

The year 1929 marked an increased output of books dealing with social research. The two under review are designed especially for textbooks in this field. *An Introduction to Social Research* proposes "to present the 'elements' which enter into the present-day problem of social research in such way as to guide the student and to interest also those who have specialized in technique or who are training and directing research specialists." (p. v.) Research is conceived in terms of approaches, methods, and procedures, distinctions which may or may not be necessary. (For a further discussion of this point see Blumer's review, *American Journal of Sociology*, XXXV, pp. 1109-1111.)

The first five chapters deal with the nature and methods of science, the relationships among the sciences, and the range of social research. Next, follows a discussion of the types of approach, philosophical, analogical, biological, psychological, anthropological, politico-juristic, economic, and sociological. On the whole, these approaches constitute "a descriptive general analysis of the status of social science in its major developments." (p. 91) Chapters XIV to XIX deal with method, of which there are six types: historical, case, survey, experimental, statistical and scientific-human. In the last named the authors reiterate the difficulties met in dealing with human phenomena. The remainder of the book is devoted to types of procedure and is less methodological. Here are found instructions and suggestions for defining and delimiting the subject, collecting bibliography, taking notes, conducting interviews, analyzing data, and preparing the manuscript.

Social Research deals primarily with observing and recording data, having for its aims (1) "To emphasize the importance of accurate and objective observation as the first step in scientific method," (2) "To inculcate a healthy skepticism of, and a critical spirit toward, statistical data by acquainting the student with difficulties, danger, and inaccuracies to which the collection and interpretation of social data are especially subject," (3) "To give a general knowledge of the technique of gathering original data." (p. viii) The first task is to improve the instruments of observation. To this end the author has developed schedules, score cards, and various statistical devices. Unless data can be compared quantitatively it is not of scientific value.

The statistical method is, therefore, the method *par excellence*. Such being the case, generalizations from the life history, documents, the case study, and the interview remain largely useless for scientific purposes. The question here is: In the understanding of human relations, is the value decreased or increased by collecting data so as to yield statistical generalizations? As Hyde points out may not some, at least, of man's least measureable characteristics be most significant sociologically. (Compare "Can Science Control Life?" *Atlantic Monthly*, CXLVI, pp. 242-252.) But on the whole, Lundberg's book will

help to meet the need of teachers and students in research. H. G. DUNCAN
University of New Hampshire

BALDWIN, J. W. *The Social Studies Laboratory.* New York: Columbia University, 1929. vi + 98 pp.

This book is the outcome of an attempt to determine what constitutes the minimum laboratory equipment necessary to make possible effective teaching of the social studies in grades four to twelve.

The author recognizes that a greater interest and a greater emphasis upon those subjects dealing with social relationships has developed, but that the interest and demand are in advance of the equipment and technique for furthering such ends. The laboratory is looked upon by the writer as providing an environment which encourages creative, self expressive activity, through which pupils may acquire knowledge, feelings, and skills with opportunity for expressing such responses. This laboratory is to so stimulate the child's tendencies to construct, to imitate, to manipulate, and to investigate as to urge him to acquire these social responses with effective speed and accuracy. What such a laboratory should contain seems to be the writer's chief concern.

The research which resulted in this volume is based upon a study of four sources. First, a critical review of the literature available for tracing the development of the problem was made. Then, the writer made a careful analysis of 132 courses of study and 32 books on method, each dealing with some aspect of the social studies, to discover what teaching aids were suggested by them. Thirdly, he visited 32 schools to study the provisions made for the teaching of the social studies. Lastly, an information blank (which is explained in chapter II) was answered by 388 teachers and administrators. Since these sources all represent the most progressive workers in the field, the results tabulated seem to indicate the best tendencies and practice in use at the present time. Chapters three, four, and five tabulate the results of the inquiry. As a result of the information gained, the author summarizes the general tendencies, the non-uniformity in the uses, and the needs of the laboratory for the teaching of the social studies.

In the final chapter the writer attempts to show how the ideal laboratory should be constructed, organized, and equipped, and what activities should be performed in order to promote the desired responses to social phenomena. The literature upon the subject has been carefully indicated and analyzed. Experiments by leaders in the field have been carefully observed and criticized. From these data the writer concludes how the social studies laboratory should be equipped.

Baldwin's book should be valuable to administrators in constructing or remodeling school buildings to make proper provision for the social studies. It should also assist the administrator in selecting from the vast number of aids available those best adapted to the requirements of the social studies classes. It should be valuable to teachers in indicating supplementary materials and how to get them.

The study represents a careful survey of existing practice in teaching the social studies. The books and articles written on the laboratory and laboratory methods have been carefully analyzed. The conclusions wherein the writer points out how a laboratory upon each level should be equipped are clearly stated and well supported. BLANCHE L. MCDILL
Miami University

HITES, LAIRD T. *The Efficient Christian College.* New York: Macmillan Company, 1929.

This is an important book for everyone who has the well-being of the churches and Christian education at heart. Dr. Hites makes constructive suggestions, and gives a comprehensive view of what we may properly expect from an efficient Christian college, namely, graduates who are Christian in spirit and understanding, and ready to pay dividends in Christian leadership.

The Christian college should obviously lead its students to a broad understanding of Christianity. They should be oriented scientifically in their religious outlook and understanding, should be trained practically for the church tasks ahead, and should be helped to become devoted and enthusiastic Christians for business and professional life as well as for the opportunities afforded by the whole church program.

The Christian college should not look upon itself as an "A.B. degree" factory, nor a sieve to secure a few entrants for graduate and professional schools. It should rather think of itself as a training school for leaders in all forms of religious education. The author suggests a wide range of positions in the general church life for which the Christian college should train leaders. Starting with the Sunday School teacher and local church officer, he mentions secretaries of county, city, and state religious organizations, social workers, Y.M.C.A. and Y.W.C.A. secretaries, ministers, and missionaries and denominational executives.

An interesting point made is that special help should be given the mediocre and other students who are apt to drop out by the middle of the college course, since the church gets very much of its steady support and leadership from them.

Every student should, of course, be trained as a *truth seeker*, frankly and intelligently facing all the facts of life, and accustomed to think and form opinions for himself. But primarily, says the author, the Christian college should enable the student to *find God*, and to *find Him in the entire college process.*

The religious spirit and life should be presented naturally but specifically in every course, in every teacher, in all campus and community life. The whole college curriculum, teaching and life should inculcate religion as "dynamic and effective loyalty to Jesus and the human values he represents." (p. 79)

Specific religious courses should be scholarly and hard enough to place them academically on an equal with any course in the college. Dr. Hites gives a weighty chapter to the discussion of a religious curriculum:

	Hours
For Freshmen:	
1. Religion and Life.....	3
2. Education and Life.....	3
For Sophomores:	
1. Old Testament	4
2. New Testament	4
For Juniors:	
1. Educational Functions of the Church	4
2. Educational Program of the Church	4
For Seniors:	
1. Major Religions of the World..	4
2. Missionary Movements	4

Thus he would give the student a year of orientation in religion before introducing him to the conventional study of the Bible. The first two years would constitute a minor in religion. The addition of the last two years would constitute a major.

But the author's greatest emphasis is on the teachers' accepting as their chief aim the task of focusing every course on

Christian facts, Christian character and Christian life, instead of omitting facts and emphasis alike as is now generally done.

He would exalt the whole status of religion by placing a *dean* in charge of student religious life, to "make religious life on the campus a spirit, a movement in which all may find themselves, rather than an organization that will try to 'do things'." (p. 221)

The sheet anchor of the author's hope is a fine spirit of friendship and personal fellowship between teachers and students, in classroom and out. He thinks suitable teachers can be had by carefully choosing new ones, and by re-training present teachers through their attendance at summer courses in Theological Seminaries and Schools of Religion. The initiative for this better regime may be found in the denomination, the faculty, the students or, most likely, from a president of vision.

This is a book for all interested in better Christian colleges. It should seem constructive to all shades of belief except the most conservative.

It is a readable book. The informed layman will like it, and will see his children's college life through different eyes. The college trustee will see possibilities for better things through its suggestions. The busy president will find here a clear and forceful summary which he will want everyone on the board and faculty to read. The college professors, if they are not deceived by its lucidity and repeated emphases, will find in it an inspiration to finer teaching and fellowship than most of them have ever dared to undertake. Many local church programs will be radically improved if the college graduates in its constituency can be gotten to read these stimulating pages.

Jamaica, N. Y. E. C. MACKLIN

BETTS, GEORGE H., AND KENT, RAYMOND A. *Foreign Language Equipment of 2325 Doctors of Philosophy.* Bloomington: Public School Publishing Co., 1929. vi + 151 pp.

A questionnaire study to ascertain from holders of the Ph.D. degree, (1) the extent of foreign language study; (2) use made of foreign language during graduate study and subsequently; (3) estimate of skill possessed in use of foreign language during graduate study and subsequent change in skill; and (4) other technical instruments needed for graduate and later study.

The data were obtained from a random sampling of graduates of years 1915 to 1926 from nearly all the universities belonging to the Association of American Universities representing all the major departments. The numbers ranged from 590 in chemistry to 23 in geography, a total of 2325.

The study reports upon each departmental group separately, giving for each three tables followed by the authors' comments. These tables concern, (1) use made of foreign language; (2) average number of years of formal language study; and (3) estimated language skill and its persistence.

The data from all the departments are brought together in a summary chapter followed by the authors' conclusions.

This study was admirably planned, and is briefly, clearly, and systematically reported. The outstanding fact from the summary is that of all those offering German or French, 75 to 80 percent felt their skill to be fair or poor during the period of graduate study, and about one-third feel that their skill has remained the same since graduating, while more than two-fifths feel that their skill has decreased. A skill so poorly developed

has only a slight use as a practical tool in reading the foreign language.

The authors' conclusions seem well supported by the data. Among the most significant of these conclusions may be given the following:

1. "Considering foreign languages solely as a tool we may therefore conclude that there is no justification for the blanket language requirement applied to all the candidates for the Ph.D. degree.

2. "Under present conditions our actual Ph.D. language attainment is not sufficient to make the languages function satisfactorily as tools, as culture, or as hurdles for a considerable proportion of the candidates."

University of Chicago F. J. KELLY

RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to Editor A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

Bulletin of the International Bureau of Education, No. 16. Geneva, Switzerland: International Bureau of Education, 44, Rue des Maraîchers, July, 1930.

The International Bureau of Education serves as a center of information and clearing house on all matters of education, collecting and distributing information of various sorts. The members are: the Republic and Canton of Geneva, Poland, Ecuador, Spain, Egypt, and the Czechoslovakian Ministry of Public Education. This bulletin contains documents and reports, educational news from the various countries, and a bibliography.

GREENLEAF, WALTER J. "Land-Grant Colleges and Universities," Annual Report, *Bulletin of the Office of Education*, United States Department of the Interior, 1930.

A presentation of various facts concerning the status of these institutions.

ROGERS, JAMES F. "Schools and Classes for Delicate Children," *Bulletin of the Office of Education*, United States Department of the Interior, 1930.

A study of the present status of schools and classes for delicate children, open-air schools, open-window rooms, nutrition classes, etc.

"Seventeenth Annual Conference on Educational Measurements," *Bulletin of the School of Education, Indiana University*, Bureau of Coöperative Research, VI, No. 5, Bloomington, Indiana, 1930.

A bulletin containing addresses by McCaughen, Patty, Buswell, Woody, Franzén, and Remmers, on various phases of measurement.

WRIGHT, EDITH A. "Bibliography of Research Studies in Education, 1928-1929," *Bulletin of the Office of Education*, United States Department of the Interior, 1930.

This contains summaries of researches pertaining to special problems and to the different school and professional subjects. A valuable summary.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

BROTHERS, E. Q. "Legal Status of the Publicly Supported Junior College—June, 1929," *School Review*, XXXVIII (December, 1930), 737-749.

A survey of the school codes of the various states relative to junior colleges. The author is of the opinion that the junior college movement is a growing movement and may ultimately lead to a reorganization of both secondary and higher education.

DAVIS, DONALD P. "Financial Policies in the School District of Arnold, Pennsylvania," *University of Pittsburgh School of Education Journal*, VI (September, 1930), 25-40.

A study of the financial policies of the school district of Arnold, Pennsylvania, as revealed by an examination of the records of the school district.

ELIASSEN, R. H., AND ANDERSON, EARL W. "The Supply of Teachers and the Demand," *Educational Research Bulletin*, IX (November 5, 1930), 437-473. Columbus, Ohio: College of Education, Ohio State University.

The authors present a summary of studies that have appeared since 1924 dealing with the supply and demand of teachers, sources of data, techniques, findings, trends, etc.

WAHLQUIST, JOHN T. "The Status of the Junior College Instructor," *Junior College Journal*, I (December, 1930), 125-134.

An investigation of the social, economic, professional, and legal status of junior college instructors. Among other things the author finds that the economic and professional status of instructors in public junior colleges is superior to that of instructors in private institutions.

WEIDEMANN, C. C. "The Present Status of Physical Education Programs in Nebraska High Schools," *University of Nebraska Publication*, III (October, 1930), 4-25, 28.

A statement of the present status and needed developments in the physical education program of the high schools of the state of Nebraska.

EXPERIMENTAL STUDIES OF LEARNING AND TEACHING

DEAM, THOMAS M. "Unit Organization Versus Chronological Organization in Teaching American History," *School Review*, XXXVIII (December, 1930), 782-786.

A comparative study of the unit organization and the chronological organization in the teaching of two classes in American history. The teacher using the two methods seemed to feel that the chronological organization was superior, but the differences obtained through the use of achievement tests were statistically insignificant.

GARIAYEVA, RAISSA. "Sur La Loi de L'Educabilité (On the Law of Educability)," *Archives de Psychologie*, XXII (February, 1930), 144-152.

The author discusses Heinis's exponential curve:

$$y = a - be^{-\frac{x}{d}}$$

He proposes a hyperbolic equation of three parameters, as follows:

$$y = \frac{x}{a - bx} - C$$

GATES, ARTHUR I. "Characteristics and Uses of Practice Exercises in Reading," *Teachers College Record*, XXXII (December, 1930), 221-235.

An article describing the materials and methods used in practice exercises in reading.

KEEN, ANGELINE M. "Growth Curves and IQ's as Determined by Testing Large Families," *School and Society*, XXXII (November 29, 1930), 737-742.

Growth curves were secured for the Stanford Binet tests for 200 cases repre-

senting 35 families. The author discusses the advantages and applications of this method.

"The Ability of Children in Map Reading," *Educational Measurements for the Class Teacher*, No. 16 (November, 1930), 15 pp. New York: Eugene A. Nifenecker, Director, Bureau of Reference, Research and Statistics, Board of Education of the City of New York.

An analysis of the skills involved in map reading and suggestions for their improvement.

TRIPP, I. "*Heilpädagogische Psychologie* (Remedial pedagogy)," *Psychol. Rundschau*, II (1930), 121-123.

In order to have value, discipline must result from the free-will impulse, not from coercion. The author shows methods of procedure as situations for discipline arise that will develop the attitude of self-control that is desirable as an outcome. (By courtesy of *Psychological Abstracts.*)

WHETZEL, H. H. "An Experiment in Teaching," *Scientific Monthly*, XXXI (1930), 151-162.

Students in a class in plant pathology do their laboratory work with a minimum for formal guidance and control and a maximum of initiative. The author makes recommendations. (By courtesy of *Psychological Abstracts.*)

PUPIL ADJUSTMENT, GUIDANCE, AND WELFARE

HUTSON, PERCIVAL W., AND WILSON, MALCOLM G. "Practices in Curricular Guidance," *School Review*, XXXVIII (December, 1930), 750-759.

A questionnaire study based upon returns from heads of departments of mathematics in 51 high schools enrolling from 500 to 999 pupils and from 81 schools enrolling 1,000 pupils or more. The author concludes that curriculum guidance is a function performed primarily by principals and teachers rather than by counseling specialists.

CURRICULUM RESEARCH

SYMONDS, PERCIVAL M. "Real Topics for Writing and Speaking," *School Review*, XXXVIII (December, 1930), 765-775.

An analysis of the topics for written composition with a statement of their frequency, reality, and importance.

MEASUREMENTS, STATISTICS AND METHODS OF EDUCATIONAL RESEARCH

CUTRIGHT, PRUDENCE, AND SHOEMAKER, WARD A. "Is the Rating or Marking of Character Traits Practicable?" *Educational Method*, X (December, 1930), 158-161.

A comparison of the results of an objective measurement of one character trait against the marks given by teachers, from which the authors conclude that teachers' marks of character traits are highly unreliable.

KRAMER, GRACE A. "The Relation of the Testing Program to Promotion." FRAZEE, LAURA, "Standards of Promotion for Primary Grades." DOUGLASS, CARLETON E., "Promotional Standards in the Intermediate Grades." MELVIN, ETHEL B., "How the Schools Participated in Determining Standards of Promotion." CHAPMAN, HAROLD B., "Promotional Statistics." *Baltimore Bulletin of Education*, IX (December, 1930), 73-90.

A series of articles dealing with policies and standards of promotion in the Baltimore Public Schools.

TYLER, RALPH W. "A Test of Skill in Using a Microscope," *"Educational Research Bulletin,* IX (November 19, 1930), 493-496. Columbus, Ohio: College of Education, Ohio State University.

A check list for evaluating students' use of the microscope. The microscope test is not a paper and pencil test, but an objective device for determining the degree of skill possessed by students in biology.

MISCELLANEOUS

MEILI, RICHARD. *"Recherches Sur Les Formes d'Intelligence* (Research upon the Forms of Intelligence)," *Archives de Psychologie,* XXII (July, 1930), 14-284.

An extended analysis of the different forms of intelligence with supporting data, tables, illustrations, and graphs.

THORMANN, W. *"Möglichkeit und Aufgabe der Erziehungswissenschaft* (The Possibility and the Problem of a Pedagogical Science)," *Deutsche Schule,* XXXIV (1930), 336-342.

All sciences that arise out of life needs are in danger of existing for such needs and not in rising to the realm of knowledge for knowledge's sake. Pedagogy is in this field and has never risen to the realm of a pure science. The author deplores this utilitarian pragmatism, and rejoices that pedagogy is showing signs of entering upon an era of pure science. (By courtesy of *Psychological Abstracts.*)

NEW TESTS

BEAR, MATA V. *Bear Test on the United States Constitution.* Bloomington, Illinois: Public School Publishing Company, 1930.

This test is designed to measure the knowledge of students in grades 8 to 12 and college concerning provisions of the United States Constitution. Each exercise was chosen experimentally. The coefficient of reliability for the final edition of the test was found to be .96 on the basis of 16,116 cases tested in St. Louis.

PATERSON, DONALD G., ELLIOTT, RICHARD M., ANDERSON, L. DEWEY, TOOPS, HERBERT A., AND HEIDBREDER, EDNA. *Minnesota Mechanical Ability Tests.* Minneapolis, Minnesota: University of Minnesota Press, 1930.

The problems considered in this Research were (1) the extent to which general mechanical ability may be said to exist and to be significant for successful adjustment and adaptation in our present social and economic organization; and (2) the effect of various specific factors (such as heredity, social and economic status, race, age, sex, and training) in determining the several mechanical abilities and interests.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Editor Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Locating Educational Information.—There are three major types of educational literature, classified in terms of form in which it appears: (1) graduate theses (usually typewritten); (2) monographs, books, yearbooks, bulletins, and other published materials in bound form; and (3) articles in periodicals.

The annual or biennial lists of graduate theses in education issued by the University of Illinois for the period 1917-1927, and the annual bibliographies of research in education since 1927, prepared by the United States Office of Education, enable one to locate readily the titles of completed Masters' and Doctors' theses. Monroe's *Ten Years of Educational Research*, 1918-1927, includes the titles of Doctors' theses prepared during the decade covered.

This same volume is an excellent basic bibliography for locating materials of the second type mentioned above. The canvass of books, monographs, etc., may be brought up to date by examining the annual list of educational books, which appears during the last week of the year in *School and Society*. The list of sixty educational books of the year, which is published in the March or April number of the *Journal of the National Education Association*, is chosen annually by a group of experts from the total yearly output of more than six hundred titles in education.

Magazine articles may be located in the several periodical indexes and educational abstracts which have been enumerated in a previous issue of this department. The annual bibliographies of the Office of Education also are useful in canvassing all types of educational publications, although not so complete as the sources listed above.

Nearly all of the general and special fields of education are now represented by one or more periodicals. A complete list of educational journals may be found in the annual directory of the Office of Education. It is of interest to note the relatively large number of periodicals in two fields closely related to education, namely, psychology and sociology. In psychology there are: *American Journal of Psychology, Archives of Psychology, Comparative Psychology Monographs, Genetic Psychology Monographs, Journal of Abnormal and Social Psychology, Journal of Applied Psychology, Journal of Comparative Psychology, Journal of Educational Psychology, Journal of Experimental Psychology, Journal of General Psychology, Journal of Genetic Psychology, Journal of Social Psychology, Psychoanalytic Review, Psychological Abstracts, Psychological Bulletin, Psychological Clinic, Psychological Index, Psychological Monographs, Psychological Review.*

In sociology, or very closely related fields, periodicals of value to students of education are available as follows: *American Journal of Sociology, Historical Outlook, Journal of Educational Sociology,*

Social Forces, Social Science Abstracts, Sociology and Social Research.

Organization of Educational Research in Universities.—It is planned to publish from time to time in this department brief descriptions of educational research programs in leading universities. In this issue are accounts of educational research at Columbia, Illinois, Indiana, Kansas, and Clark.

Organization of Research at Teachers College.—Teachers College of Columbia University maintains four major research institutes. The institutes and directors are as follows: The Institute of Educational Research consisting of the Divisions of Educational Psychology, E. L. Thorndike, and the Division of Field Studies, George D. Strayer; the Institute of School Experimentation, Otis W. Caldwell; the Child Development Institute, Lois Hayden Meek; and the Institute of Practical Arts Research, Maurice A. Bigelow. In addition to these four major research institutes, extensive studies, experiments, and other types of research are carried on by various departments and individual professors in Teachers College. These activities may be grouped over the School of Education, the International Institute, and Lincoln School of Teachers College. A thirty-one page mimeographed bulletin prepared by Teachers College lists in detail the various studies in progress and the individuals responsible.

Many of the studies directed by these research organizations are reported in the series, *Teachers College Contributions to Education*, which now includes approximately 450 Doctors' dissertations. The Educational Yearbook of the International Institute describes current educational developments in foreign countries and was first published in 1925; a series of independent studies also is published by the International Institute. Additional investigations appear in the *Teachers College Record*, the Lincoln School Monographs, and in a variety of other monographs, bulletins, yearbooks, and articles.

Research at Illinois.—Educational research is conducted at the University of Illinois in the Bureau of Educational Research, in the Research Laboratory in Athletics, and by members of the instructional staff.

The staff of the Bureau of Educational Research, established in 1918, consists of a director, Dr. W. S. Monroe, an assistant director, three full-time assistants, three stenographers, and a varying number of student clerks. The Bureau has ample facilities with respect to office space and equipment. The latter includes a cumulative index of educational publications, files of the more important educational journals and monograph series, and a very complete collection of intelligence and educational tests. The following titles of recent bulletins are indicative of its activities: "Reorganization of the Secondary School Curriculum: Its Meaning and Trends," "Ten Years of Educational Research, 1918-1927," "A Selected Annotated Bibliography Dealing with Examinations and School Marks," "How Pupils Solve Problems in Arithmetic," "A Critical Study of Measures of Achievement Relative to Capacity," "The Use of Scales for Rating Pupils' Answers to Thought Questions," "Experimental Research in Education," "Locating Educational Information in Published Sources," and "Predicting the Success of College Students." Fifty-three such bulletins have been published. In addition to these bul-

letins, a series of over fifty circulars have been issued. In addition to conducting research, the staff of the Bureau of Educational Research has been of service in a consulting capacity. In its earlier years it fulfilled the function of a "clearing-house" for educational tests and test results, but this activity has been given up. The members of the staff have made occasional trips to confer with boards of education, superintendents, and others; to speak at teachers' meetings; and to conduct school surveys or testing programs.

The Research Laboratory in Athletics, established in 1925, is the second psychological laboratory in the world to be devoted wholly to problems in athletics. It has a director who is also an associate professor of education, a full-time assistant, a stenographer, and additional part-time assistance. It is amply equipped with psychological apparatus, and maintains a rat colony for use in experiments upon learning, upon exercise, etc. Some of the apparatus is connected with the playing fields, making possible records of athletic activity. The nature of the research conducted in this laboratory is indicated in the following titles: "Psychology of Coaching," "Methods of Teaching Psychological Skills in Football," "Experimental Study of Sleep of Athletes," "Types of Errors in Throwing Free Throws," "Experiment in Learning to Drive a Golf Ball." The Research Laboratory in Athletics reports its studies in such publications as the *American Physical Education Review, Athletic Journal, Proceedings of the Ninth International Congress of Psychology,* and *Journal of Health and Physical Education.*

The members of the instructional staff of the College of Education have conducted research independently of the two organizations described above. Some of this research has been reported in bulletins of the Bureau of Educational Research, but most of it has appeared in the form of textbooks and periodical articles.

Research at Indiana.—The Bureau of Coöperative Research at Indiana University was established in 1914, in connection with the development of the Educational Measurements Conference held at the University. This bureau was the second of its kind to be established in the United States, according to available information. The original purposes were threefold and were stated as follows:

1. To render assistance to school organizations and school officers in increasing the efficiency of school work in Indiana.

2. To promote the growth of educational science.

3. To stimulate individuals to further pursuit of educational research.

These purposes involve research on the one hand and service on the other. Both of these ideas have been maintained throughout the history of the bureau, as is evident from the nature of the work undertaken.

Since the bureau was first established, one phase of its activity has been that of coöperating with teachers in the field in working out practical educational problems. The results of an early study of this kind were published in a bulletin entitled "A Coöperative Study of Reading in Sixteen Cities in Indiana." A study of secondary-school problems has recently been made in coöperation with teachers in the Arsenal Technical Schools, in Indianapolis, and some of the findings are now being published. Other investigations of this type have been made under the direction of the bureau, but

have not been published. One of these, a study of achievement in fourth-, fifth-, and sixth-grade arithmetic in ten cities in Indiana, was made last year in coöperation with the South Central Superintendents Research Club of Indiana. The tests for this investigation were developed and the results tabulated and interpreted in the bureau.

A second type of work has been that of compiling and publishing bibliographies. The first of these was a bibliography of educational measurements, the second revision of which has now been published. A bibliography of school budgets and one of school buildings, grounds, and equipment also have been published. Two other bibliographies, one on school surveys and one on the teaching of English, are now in the process of completion.

A third phase of the work of the bureau has been that of developing and standardizing educational tests. Among such tests are the Child's Algebra Test, the Child's Extension of the Thorndike Drawing Scale, the Vannest Diagnostic Test in European History, the King-Clark Foods Test for Grade VI through Grade XII, the Indiana Composite Achievement Test (six forms), the Indiana Latin Achievement Test, and the Indiana Algebra Achievement Test. Other tests in process of development include tests in several high-school subjects. Other work of the bureau in test development has been that of assisting the County Superintendents Association of Indiana during the last two or three years in devising new-type semester tests for Grades III-VIII in all academic subjects by editing and checking the tests before publication and by calculating the norms after the tests had been given.

A type of investigation recently undertaken is that of studying education for world friendship. Two bulletins on this subject, "An Analysis of the Attitudes of American Educators and Others Toward a Program of Education for World Friendship and Understanding" and "Tentative Program for Teaching World Friendship and Understanding in Teacher Training Institutions and in Public Schools for Children Who Range from Six to Fourteen Years of Age," were published in 1929. Three more bulletins on the subject are now being developed, one on the philosophy and one on the psychology underlying international understanding and good will, and a third on the contributions of various nations of the world toward civilization and how they can be used in school work.

In addition to publishing the types of studies mentioned above, as well as the proceedings of the High-School Principals Conference, of the Educational Measurements Conference, and of the Elementary Supervision Conference held at the University each year, the bureau directs and publishes miscellaneous research studies in education, made by faculty members and graduate students. Among those being developed at the present time are:

1. Teacher supply and demand in Indiana.
2. An analysis of English tests.
3. An analysis of English textbooks.
4. An analysis of English courses of study.
5. A study of factors entering into successful teaching.
6. A study of opportunities for positions in research bureaus and requirements in terms of personal characteristics, training, and experience for such work.

A number of other studies also are being conducted which will be presented at educational conferences, but which

will not necessarily be published as separate bulletins.

The work of the bureau at the present time is carried on by the director, Dean H. L. Smith, and four research assistants who are graduate students in the University working toward the Ph.D. or Ed.D. degrees. The publication work connected with these studies is handled by one full-time assistant in the bureau, and all clerical work is taken care of by student help.

Since its establishment the bureau has made an effort to give to the schools of the state the greatest possible help in working out their educational problems. It also has encouraged individuals to undertake research problems, by giving advice or direction. Educators of the state hope that a greater appropriation of funds for this purpose will soon be made in order that additional projects may be undertaken.

Ten Years of Research in Kansas.—The *University of Kansas Bulletin of Education* for October, 1930, is a special number reviewing the work of the University of Kansas Bureau of School Service and Research.

The first step in the establishment of the Bureau was taken by action of the Board of Administration in February, 1916. This Bureau was established in the School of Education upon the recommendation of the Dean of that School, Dr. F. J. Kelly, who also acted as Director of the Bureau until 1918. Dr. C. A. Buckner, who became the Director in 1918, continued in the position for two years. His successor, Dr. F. P. O'Brien, has directed the activities of the Bureau for the ten-year period, from 1920 to 1930, which is the period covered in the report. It was upon the recommendation of Dean F. J. Kelly in 1920 that the Bureau became a joint agenc of the School of Education and the D vision of Extension Education.

The following list of activities is i dicative of the service of the Bureau although not complete or all-inclusive.

1. Survey studies of city, small town and rural schools; instructio needs; and of college or universit problems.
2. Conferences on local or communit school problems.
3. Educational investigations and re search (of a general nature).
4. Educational publications and edi torial work.
5. Information and counsel service o school problems.
6. Statistical and reference laboratory in education.
7. Directing research studies of grad uate students in education and making materials available for such purposes.
8. Coöperating with other agencies.

Research in Education at Clark University.—The educational research work which is done in an institution is partly dependent upon the nature of the institution and the facilities offered by it. Clark University, as a small institution, has offered better opportunity for an intensive study of one or two problems than for undertaking a large number of projects at any given time. The research in education in this institution during the last four years has been confined mainly to a study of character education and citizenship training as means of assisting children to adjust themselves adequately to the rapidly changing conditions of life. The aim has been to experiment with different plans and materials for the purpose of discovering definite techniques which may be recommended to teachers

Helpful coöperation in this work has been given by two superintendents of public schools and by the head of a parochial school.

The plan and materials which seem most practical for use in the schools are being made available in book form. The more detailed results of the several studies have been embodied in various books, magazine articles, and theses.

Record of Research for 1928-29.—Research titles in education have been collected and published by the Office of Education, Department of the Interior, in a bibliography covering the 1928-1929 school year. The bibliography, prepared by Edith A. Wright in the library division of the Office of Education, lists 3,065 investigations by 317 research agencies. It gives information on 217 Doctors' theses and 1,209 Masters' theses. The theses' tabulation represents a continuation of work done by Walter S. Monroe, Bureau of Educational Research, University of Illinois, from 1917 to 1927. Material for the bibliography was obtained from replies to letters of inquiry sent to all agencies known by the Office of Education to be engaged in educational research, including colleges and universities, city and State research bureaus, and educational organizations.

Survey of Education in Alaska.—The Carnegie Foundation for the Advancement of Teaching has furnished funds for a comprehensive survey of the educational system of the Eskimos and Aleuts of Alaska, under the auspices of the United States Office of Education. The School of Education of Stanford University has been asked to assume responsibility for the actual work of the survey. Professor Walter C. Eells spent part of September and October in the vicinity of Nome, Alaska, engaged in work on the general plans for the survey and in visiting a number of native schools on Norton Sound. It is planned to make an extensive investigation of the economic and sociological status and prospects of the Eskimo tribes and a detailed study of the organization, personnel, and curriculum of the schools.

Since the Eskimos live entirely in small settlements in widely scattered localities, with unusually difficult travel conditions, the hardships involved in visiting the schools while in session during the winter are very great. The actual field work will be done for the most part by Mr. and Mrs. H. Dewey Anderson, graduate students at Stanford University, who sailed from Seattle for Nome in July. They will remain in the Arctic during the winter, traveling for many weeks by dog team, in order to study the various schools. Careful tests of the mental, physical, mechanical, and musical abilities of the children in the schools will be made.

New Journals Dealing with the Child.—A new quarterly, *Child Development*, will be published by Williams and Wilkins Co., of Baltimore. It is designed to assemble the representative fields in child study and to coördinate the results of the different types of research in these fields. The journal is open primarily to research articles. The whole field of child study up to adolescence will be covered. The editorial board of specialists is as follows:

John E. Anderson, Director of the Institute of Child Welfare and Professor of Psychology, University of Minnesota, psychology.

E. V. McCollum, Professor of Biochemistry, School of Hygiene and Public Health, Johns Hopkins University, nutrition.

Edwards A. Park, Professor of Pediatrics, Johns Hopkins Medical School, physiology and pediatrics.

Mandel Sherman, Director of Research, Washington Child Research Center, psychiatry.

T. Wingate Todd, Professor of Anatomy, Western Reserve University, anatomy.

Buford Johnson, Director of the Child Institute of the Psychological Laboratory and Professor of Psychology, Johns Hopkins University, editor-in-chief.

The Massachusetts Society for Mental Hygiene announces that through the generosity of the Godfrey M. Hyams Trust it will begin early in January the publication of a quarterly to be called *Understanding the Child*. This new magazine will be distributed free to every teacher in the public schools of Massachusetts. Its purpose is to bring to them a knowledge of the principles and practices of mental hygiene. The editorial direction of this new magazine has been placed under an Editorial Board consisting of J. Mace Andress, Editor, and Dr. E. Stanley Abbot and Dr. Henry B. Elkind, Associate Editors. There will be a Consulting Editorial Board of fifteen members, composed of experts in the fields of mental hygiene and education, such as William H. Burnham, C. Macfie Campbell, Augusta F. Bronner, Payson Smith, Lawrence A. Averill, and others. This Board, together with the Editors, will insure a high standard not only from the point of view of presentation but from that of scientific accuracy. A small annual subscription fee to the magazine will be charged for those who are not public-school teachers in Massachusetts.

Statistics on Professional Education.—Circulars Nos. 22, 23, and 24 of the United States Office of Education contain interesting information respectively concerning the professions of law, library service, and architecture. Enrollment of students in preparation for these professions is as follows: day students in law, 19,954, and night, 24,556; library training, 1,429; architecture, 4,659, and architecture-engineering, 1,622.

Bibliography on Handwriting.—Among the addresses and reports of committees delivered at the 1930 meeting of the National Association of Penmanship Teachers and Supervisors is a classified bibliography which extends over twenty-three pages.

Annual Report of the Institute of International Education for 1930.—The activities of the Institute for 1930 include supervision of exchange fellowships with foreign countries, promotion of registration in foreign summer sessions, making available for institutions of higher learning distinguished scholars and publicists from abroad as lecturers, placement of foreign and American teachers, and strengthening of Latin-American cultural relations. The annual report includes lists of exchange students for the year, 1929-30, arranged by countries and institutions, and other appointments and awards for study abroad, including the junior-year-abroad students.

Annual Report of the Carnegie Corporation for 1930.—Grants totalling $3,709,250 during the year ending September 30, 1930, in support of educational enterprises are reported by President Frederick P. Keppel of the Carnegie Corporation of New York in his annual announcement of the work of the organization, established by Andrew Carnegie in 1911 "for the advancement and diffusion of knowledge and understanding" among the peo-

ple of the United States, Canada, and the British Colonies. The appropriations, while showing a wide diversity of interests, fall within some half-dozen general divisions, such as college and university, library service, educational and scientific research, fine arts, and adult education.

The Carnegie program as to libraries seems to have shifted almost entirely during the past decade from provisions for library buildings to the more fundamental element of library service as shown by grants totalling a half million dollars to liberal-arts colleges for developing their libraries through purchase of books for general undergraduate reading, by $300,000 to be spent in extending training for librarianship in the United States and Canada, in providing a demonstration of dental library service at the University of Michigan, and in increasing the effectiveness of strategic library projects in the United States, Canada, and South Africa. The interest in college libraries is the result of belief on the part of the Corporation Trustees that college education today depends less upon what the professor tells the student in the classroom or directs him to study in a textbook than upon what the student digs out for himself. Colleges have received great sums from many sources during the past twenty years, but have spent relatively little in buying books for their students.

Research, educational and scientific investigations, and publications appear year by year as an increasing interest of educational foundations, and during the year just closed the Corporation has supported projects which, it is believed, will serve to advance and diffuse knowledge. The sum of $204,500 was granted for studies in dental education, architecture, engineering, costs of medical care, land economics, and public utilities, Alaskan and second-generation Oriental educational opportunities, nutrition, singing, vitamines, leukemia, physics, and the durability of printed records. Learned societies received grants totalling $125,000.

The Carnegie Corporation was the first of the large educational endowments to express an interest in two phases of activity which until a few years ago had received but little recognition from foundations, namely, fine arts and adult education. In the latter field, grants were made to various projects in rural education, problems of the blind, alumni education, education by radio, workers' education, and to various other organizations concerned with continuing education by adults during leisure time, such as the People's Institute of New York, the Foreign Language Information Service, and the Civic Federation of Dallas.

The work of the Teachers Insurance and Annuity Association, which operates for the benefit of teachers in higher education, is reviewed.

In reviewing the year's activities, President Keppel calls attention to "the foundation idea" as it appears in modern life. He says:

"If what may be called the *foundation idea* has something of importance to contribute to human progress, it is obvious that opportunity should not be limited to the wealthy individual capable of creating an independent trust, but that the way should be open for persons of limited means to pool their individual gifts, as indeed they have done for centuries in the field of religion by their contributions to the endowments of the Roman Catholic Church. To a steadily increasing degree the community trusts are making this provision to meet the general needs of specific communities. When, however, the purpose is specific rather than general, and the desired participation is not

local but nation-wide, the situation is far less satisfactory. Legally, there is nothing to prevent a group of people, who wish to further some worthy purpose, from organizing and calling their enterprise a foundation, but when there exists no financial foundation whatever upon which the structure is to rest—and this is the situation in an increasing number of instances—the use of the term is misleading to the public.

"Underlying the wide diversity of opinion as to details, which is in itself a sign of vitality, there is evident a growing sense of the importance of the responsibilities and opportunities of the foundation in the modern world."

Biographical Kindergarten Study.—Professor Fletcher Harper Swift of the School of Education of the University of California at Berkeley has recently completed a biographical study entitled *Emma Marwedel, 1818-1893, Pioneer of the Kindergarten in California.* Up to the present time the information available regarding Miss Marwedel has been both meager and inaccurate. The importance of her work may be inferred from the fact that it was she who trained Kate Douglas Wiggin and other early leaders in the kindergarten movement in the West. According to Elizabeth Palmer Peabody, it was Miss Marwedel who first revealed to her a genuine Froebelian kindergarten, in the city of Hamburg, and inspired her to devote the remainder of her life to extending the kindergarten throughout the United States. The study will be published as No. 2, Vol. VI, University of California Publications in Education. Arrangements also have been made for publishing a translation of this bulletin in Germany.

Word has just been received of the appointment of Rudolph D. Lindquist as President of State Teachers College at Chico, California. V. Kersey, State Superintendent of Public Instruction gives us the following information concerning President Lindquist's experience: Received the A.B. and M.A. degrees from the University of California; Rural teaching in Minnesota, 1907-1909; Private school teaching in Kansas, 1909-1911; Vice-principal and teacher high school Elko County, Nevada, 1915-1917; Supervising principal elementary school, Berkeley, California, 1919-1924; Instructor in elementary education at University of California, 1924-1930; Instructor in A.E.F. University at Beaune, France, 1918; Assistant director of teacher training, University of California, 1924-1925; Director of Research, Oakland Public Schools, 1925-1927; Assistant Superintendent in charge of elementary schools, Oakland, California, 1927-1931; also chairman of 1933 Yearbook Committee of Department of Supervisors and Directors of Teaching of the National Education Association; Reorganized supervision of elementary instruction in Oakland, developing a unique and highly efficient organization with excellent results.

DOCTORS' THESES UNDER WAY IN EDUCATION, 1930-1931[1]

Compiled by CARTER V. GOOD
University of Cincinnati

KNOWLEDGE of significant investigations under way should aid in breaking down academic isolation in research, in avoiding duplication, and in promoting coöperation. Coöperative research is assuming a place of increasing significance in education as evidenced by the Educational Finance Inquiry, the studies of the Committee on Administrative Units of the Commonwealth Fund, the Modern Foreign Language Study, and the national surveys of secondary education, teacher training, and the social studies. In certain of these programs of research Doctors' dissertations have played an important part. It is hoped that this list of Doctors' studies under way in education will prove of value to professors, graduate students, public-school investigators, and others interested in current research in education.

The collection of such a comprehensive list of theses was made possible only through the coöperation of the twenty-six graduate institutions[2] which had forwarded the titles of their Doctors' dissertations under way by the time it was necessary to send copy to press. With the exception of two schools the list of theses is believed to be complete. Any titles subsequently received will be printed in a later issue of the *Journal of Educational Research*.

In each instance the name of the candidate, title of the thesis, and graduate institution are given, in the order named. In nearly all cases the name of the major adviser is given following the name of the university involved. For the convenience of the reader a topical index has been prepared. An effort has been made to classify each thesis title under one or more appropriate major divisions of education. The numeral in each instance refers to the number of the thesis in the bibliography which is arranged alphabetically by surnames of candidates for Doctors' degrees. In a few cases titles do not appear to belong in education, although forwarded by graduate schools or departments of education.

In scanning the topical index one is impressed by the total absence of Doctors' theses under way in art education and by the small numbers in commercial education, foreign languages, home economics, industrial arts, and music.

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[1] Additional copies may be secured from the Public School Publishing Co., Bloomington, Illinois.

[2] Boston, California, Catholic University, Columbia, Cornell, George Washington, Harvard, Illinois, Indiana, Iowa, Johns Hopkins, Kansas, Michigan, Missouri, New York, Ohio, Oregon, Peabody, Pennsylvania, Pittsburgh, Southern California, Stanford, Texas, Washington, Wisconsin, and Yale.

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1. Adams, Jane E. "The Factor of Family Descent in the Teaching Profession." Stanford. Almack.
2. Aery, William Anthony. "The Hampton Idea of Education, 1868-1893." Columbia. Bagley.
3. Agee, Kenneth Arnold. "The Growth of Mentally Superior Children." Harvard. Dearborn.
4. Akrawi, Matta. "Curriculum Construction in the Elementary Public Schools of Iraq." Columbia. Kandel.
5. Albright, D. M. "Legal Decisions of the Superintendent of Public Instruction in Pennsylvania." Pittsburgh. Davis.
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9. Anderson, Marion Agnes. "The Effect of Paragraphing upon Comprehension in Reading." Iowa. Horn.
10. Anderson, Mary Raleigh. "Christian Education for Girls in Chile (Two Provinces)." Columbia. C. Alexander.
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34. Ballou, Willard A. "Professional Acquirements of Teachers College Faculties." Pennsylvania.
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43. Bell, Reginald. "A Comparative Study of the Educational and Civic Progress of Japanese Children in American Schools under Segregation and Non-Segregation." Stanford. Eells.

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66. Bond, Elias Austin. "The Professional Treatment of Subject Matter of Arithmetic for Teacher Training Institutions." Columbia. Upton.
67. Boogher, E. W. G. "Secondary Education in Georgia." Pennsylvania.
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83. Buchholz, Paul Henry. "A Study of the Significance in Student Life

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103. Chamberlain, Leo M. "The Housing of Thirty Public Junior Colleges of the Middle West and Tentative Standards and Principles Relating to Buildings, Equipment, and Associated Administrative Problems." Indiana. Smith.
104. Chambers, Merritt Madison. "Legal Aspects of Personnel Problems in State Administration of Higher Education." Ohio. Lewis.
105. Chambers, R. L. "A Study of the Achievement of Elementary School Children Before and After the Removal of Certain Physical Defects." Pennsylvania.
106. Chase, Willard L. "Directing Children's Study of Elementary History." Columbia. Hillegas.
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109. Christofferson, H. C. "A Professional Course in Geometry for Teachers." Columbia. Reeve.

110. Clapp, Mary W. "Women in the Old Testament." Columbia. Bewer.

111. Class, Edward C. "Prescription and Election of Studies in Elementary School Teacher Training Curricula in State Teachers Colleges." Columbia. Evenden.

112. Clement, Warren P. "College Administration." Stanford. Eells.

113. Clemente, Tito. "Proposed Objectives and Guiding Principles for the Reconstruction of the Elementary School Curriculum of the Philippines." Columbia. Bruner.

114. Cline, E. C. "An Investigation and Analysis of the Exploratory Function of Junior High Schools in the North Central Association." Cincinnati. Eby.

115. Clinton, Riley J. "A Study of Subject-Time Allotment and Achievement." Stanford. Almack.

116. Cluley, John B. "The Effect of Teaching Procedure on Spread of Training and Its Relation to Intelligence." Wisconsin. Barr.

117. Cole, Wilson G. "The Making of a Public Speaking Curriculum for the Training of Ministers in the Methodist Episcopal Church." Pittsburgh. Carrier.

118. Coleman, John Harvard. "Pupils' Interests in Written Composition." Columbia. Symonds.

119. Coleman, William H. "A Critique of Spelling Vocabulary Studies." Columbia. Gates.

120. Collier, Paul D. "The Weighting of Certain Brightness, Environmental, and Maturity Factors in a Classification Program." Columbia. Mort.

121. Colman, Susan E. "An Experimental Study of the Activity Curriculum in the Primary Grades." Wisconsin. Barr.

122. Confrey, J. Burton. "Secularism in American Education: Its Origin and Development." Catholic University. McCormick.

123. Connor, Ruth. "An Analysis of the Relation between Rating on Standard Intelligence Tests and Success in the Various Phases of Study within the Field of Home Economics in College." Columbia. Cunningham.

124. Conrad, L. R. "Comparison of Efficiencies of Several Methods of Selecting a Vocabulary for a Test of Mental Age." Michigan.

125. Cooper, Alice C. "A Textbook in World Literature for Junior Colleges." Stanford. Proctor.

126. Cooper, Elizabeth E. "The Reading Habits of One Thousand Professional Men." Pittsburgh. Yoakam.

127. Cooper, Lewis B. "Sabbatical Leave for College Teachers." Cincinnati. Good.

128. Coppens, Verle Frances. "A Study of Teacher Training in Scotland." Columbia. T. Alexander.

129. Cotterman, Homer Roy. "Court Decisions Affecting Public School Personnel." Ohio. Lewis.

130. Crabtree, Eunice K. "A Study of the Effect of a Course in Children's Literature upon Students' Own Literary Appreciation (Ex-

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131. Craig, J. Brad. "Concerning the Educational Program of the United Presbyterian Sunday Schools." Pittsburgh. Carrier.

132. Crawford, John R. "The Age and Progress Factors in Test Norms." Iowa. Greene.

133. Cressman, George R. "Comparison of the County and Township Units of Administration and Financial Support as Related to the Problem of the Reorganization of the Unit of Administration in Pennsylvania." Pennsylvania.

134. Crosby, Maurice Hayes. "Individual Instruction in Secondary Education: Its Possibilities and Limitations." Harvard. Beatley.

135. Crowley, Mary Roberts. "The Academic Achievement of Negro Children Attending Mixed Schools Compared with That of Negro Children of Equal Intelligence Attending Negro Schools." Cincinnati. Pechstein.

136. Crump, Bonnie L. "The Comparative Intelligence of Primary School Children from the Five Civilized Tribes of Oklahoma." Columbia. L. S. Hollingworth.

137. Crutsinger, George M. "A Survey Study of Teacher Training in Texas and a Suggested Program." Columbia. Bagley.

138. Cunliffe, Rex Barnard. "Economic-Vocational Concepts of Secondary School Students." Harvard. Brewer.

139. Cunningham, Harry A. "Rooms, Furnishings, Service, and Equipment Necessary in Teachers Colleges for the Training of Intermediate Grade Teachers in Science." Columbia. Powers.

140. Cureton, Edward E. "Sampling and Response Errors in the Theory of Factors." Columbia. Thorndike.

141. Cutton, G. L. "A Study of Religious Education with Special Reference to Week-Day Instruction." Cornell. Jordan.

142. Daggett, C. J. "The Construction of a Power Test in American History." Wisconsin. Barr.

143. Dambach, John I. "Physical Education in Germany as Affected by Its Changing Social, Economic, and Political Conditions." Columbia. Williams.

144. Davis, Earl. "The Development of Teacher Training in Certain Selected States." Pittsburgh. Buckner.

145. Davis, Elwood C. "Health and Physical Education Survey Techniques in Public Schools." Columbia. Williams.

146. Davis, J. D. "An Experimental Study of the Value of Corrective Procedure with College Freshmen." Oregon.

147. Davison, Harold Jerome. "State Integration of Practical Arts and Vocational Education." Ohio. Stone.

148. de la Fontainerie, F. "French Liberalism and Education in the Late Eighteenth Century." Columbia. Reisner.

149. Dienst, Charles F. "The Protection of Permanent Public School Endowments in Idaho." Columbia. C. Alexander.

150. Ding, Gladys F. "A Study of the Laughing and Crying of Young Children." Columbia. Crabbs.

151. Dix, Lester Hencil. "The Eco-

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152. Donnelly, Harold I. "Measuring Certain Aspects of Faith in God as It Is Developed in Boys and Girls, 15, 16, and 17 Years of Age." Pennsylvania.

153. Dowell, Anita S. "An Investigation of the Health of Public School Teachers of Baltimore and Maryland." Hopkins. Bamberger.

154. Doxsee, Earl D. "Mental Habits and Characteristics as Affecting a Program of Guidance at Different Levels." California. Lee.

155. Dransfield, John Edgar. "A Technique for the Administration of an Enrichment Program." Columbia. Mort.

156. Dunlap, Jack W. "Differences and Idiosyncrasies in Number and Verbal Material with Certain Racial Groups." Columbia. Thorndike.

157. Dunlap, William C. "Quaker Education in Maryland, Virginia, and Delaware." Pennsylvania.

158. Dynes, John J. "An Investigation of the Relative Effectiveness of Two Study Techniques in History." Wisconsin. Barr.

159. Eavey, C. B. "A Study of the Relation of the Doctor's Degree in the Field of Education to Preparation for the Teaching of Undergraduate Education." New York. Creager.

160. Ebaugh, Cameron D. "A Survey of the Advancement in Mexican Education Since the Revolution of 1914." Hopkins. Bamberger.

161. Edwards, Lillian Shera. "An Historical Survey of the Field of Abnormal and Clinical Psychology." Ohio. Goddard.

162. Edwards, Margaret M. "Family Life in Four Hundred Homes of Industrial Workers in Two Southern Communities." Columbia. Bonser.

163. Elbin, Paul. "The Function of Worship in a College Community." Columbia. Case.

164. Eliassen, Reuben H. "A Follow-up Study of Ohio State University Graduates from the College of Education, 1925-29." Ohio. Anderson.

165. Elliott, Albert Wade. "The Status of the Democratic Ideal in the Field of Administration." Ohio Lewis.

166. Ellis, Emmitt. "Evaluation of State Programs of Secondary Education." Peabody. Hall.

167. Ellis, W. Daniel. "The Development of a Plan for a Continuing Study of Teacher Supply and Demand." Columbia. Bagley.

168. Emerson, Wallace Leroy. "The Administration and Organization of School Libraries." Southern California. Hull.

169. Engelhardt, M. D. "The Problems and Techniques of Educational Research." Illinois. Monroe.

170. Engleman, James Ozeo. "The Demand for Lay Leadership and the Educational Training It Requires for Work in the Field of Religious Education." Ohio. Lewis.

171. Erbacher, Sebastian. "Catholic Colleges for Men in the United States, 1850-1866." Catholic University. Rooney.

172. Essery, Florence. "The Experimental Evaluation of the Effectiveness of the Application of Three Philosophies of Supervision." Michigan.

173. Eubank, Louis A. "Certain Fea-

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174. Fairchild, Thomas. "Education for a Better World of Work in New England." Boston. Mahoney.

175. Farris, Lucien. "The Effect of Poor Vision on School Adjustment." California. Peterson.

176. Faulkner, Ethel W. "An Historical Survey of Textbooks in American History Before 1860." Columbia. Johnson.

177. Ferrill, D. T. "The County Superintendency in Kentucky." Peabody. Frost.

178. Fineberg, Solomon A. "The Presentation of Myth and Legend in Books for Jewish Sunday Schools." Columbia. Case.

179. Fisher, John J. "The Extent to Which Certain Elements of Teaching Equipment Contribute to Teaching Success as Represented by Measurable Changes in Pupils." Columbia. Evenden.

180. Fisher, Mary S. "Social Implications of the Language Development of the Pre-School Child." Columbia. Thomas.

181. Fishpaugh, Clara. "Curricula for Mining Situations (Experimentally Determined)." Hopkins. Bamberger.

182. Fitz, Kathleen. "Personality Rating of Pre-School Children." Wisconsin. O'Shea.

183. Fitzgerald, James A. "The Vocabulary of Children's Letters." Iowa. Horn.

184. Flowers, John Garland. "The Content of Student Teaching Courses Designed for the Training of Secondary Teachers in State Teachers Colleges." Columbia. T. Alexander.

185. Foberg, John A. "The Mathematical Background of Entrants to State Teachers Colleges in Pennsylvania." Pittsburgh. Rohrbach.

186. Foster, Grace Ruth. "The Reorganization of Curricula in Colleges Educating Women as Related to Social Change." Columbia. Goodsell.

187. Francis, May E. "Teachers' Contracts." Texas. Ayer.

188. Frank, Julia Mottier. "A Descriptive and Casual Study of Trends in Home Economics Education in the Secondary Schools of Wisconsin." Wisconsin. Willing.

189. Frazee, John Clifford. "A Comparative Study of Resident Professional Programs in Elementary Education Offered During the Academic Year, 1929-30, in Twelve Selected State Universities." Columbia. Evenden.

190. Freeman, C. P. "The Plant Life of the Cedar Glades of Middle Tennessee." Peabody. Shaver.

191. French, John Sprout. "The Bringing of an Emotion into the Focus of the Individual's Attention as a Means of Emotional Control." Columbia. Kilpatrick.

192. Frey, Anna Louise. "The Swan Knight in Early Literature." Peabody. Roehm.

193. Friedrich, George. "A Study of the Teaching Load of Nature and Science Teachers in Teachers Colleges and Normal Schools with Particular Emphasis on Practices of Teaching in the Field." Cornell. Palmer.

194. Fulton, Theodore. "An Historical

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195. Furbay, J. H. "A Study of Evangelical Christian Colleges." Yale. Hill.
196. Furia, John Joseph. "A Study in the Technique of Industrial Re-Education." Columbia. Snedden.
197. Gabler, Earl R. "Records that the Junior High Schools Send to the Central Office." New York. Long.
198. Garrett, Homer L. "College Success in Relation to Standing and Achievement in High School." Stanford. Eells.
199. Gellerman, William. "The Social Control of the School." Columbia. Raup.
200. Gibson, Robert E. "A Study in Character or Civic Education." Stanford. Almack.
201. Gift, Elmer Birdell. "The Content and Methods in Seventh and Eighth Grade History of Kansas Schools." Kansas.
202. Gillespie, Edna Hartman. "A Problem in Educational and Vocational Guidance." Southern California. Raubenheimer.
203. Glenn, Earl Rouse. "An Inventory of Some Aspects of Learning in High School Physics." Columbia. Powers.
204. Glintz, Leslie A. "The Development of Public Secondary Education in Manitoba." Stanford. Proctor.
205. Glick, Joseph Paul. "A Comparative Study of Negro and White Intelligence and Educational Achievement in the South." Harvard. Dearborn.
206. Goggans, Sadie. "Units of Work and Centers of Interest in the Organization of the Elementary School Curriculum." Columbia. Dunn.
207. Good, Warren R. "Effect of Training on Pitch Discrimination." Michigan.
208. Gordon, Eva L. "A Study of Personification as a Means of Science Education with a View to Determining Its Relative Value at Different Grade Levels." Cornell. Palmer.
209. Gordon, Hans C. "The Extent to Which Specialization Limits the Values of Otis IQ's in the Prediction of Specific Subject Achievement at the Twelfth Grade Level." Pennsylvania.
210. Gorgas, C. A. "A Comparative Study of Three Methods of Teaching High School Chemistry." Pittsburgh. Buckner.
211. Gorman, Frank H. "The Development of the Course of Study in Arithmetic for the First Six Grades of the Elementary School." Missouri.
212. Grant, Gordon Allan. "Industrial Arts Equipment for Junior High Schools." Columbia. Bonser.
213. Grant, Rosamond H. "Problems of College Students." Yale. Hill.
214. Greene, James E. "A Comparative Study of Different Forms of Rational Learning." Peabody. Peterson.
215. Greenwood, Walter. "Attendance and Elimination of Public Evening High School Pupils in a Large City." Pennsylvania.
216. Grogory, Marshall W. "State Administration of Teacher Certification Programs." Columbia. Elsbree.
217. Grote, Caroline. "A Study of the Housing and Living Conditions of Women Students in the Western

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218. Guardia, J. E. "Certain Phases of the Economic Geography of the Ante-Bellum South." Peabody. Parkins.

219. Gruen, Ferdinand. "The Teaching of English Grammar in the Secondary School." Catholic University. Rooney.

220. Gunn, Evelyn Mary. "A Trait-Analysis of Candidates for Teachers' Certificates." Wisconsin. Barr.

221. Gunther, Theresa C. "An Evaluation of Two Methods of Teaching Elementary Industrial Arts." Columbia. Bonser.

222. Haage, Catherine. "A Test of Functional Latin." Pennsylvania.

223. Habbe, Stephen. "Group Acceptability: Its Significance for Four Behavior Patterns in Fifty-seven Boys." Columbia. Elliott.

224. Hadley, John C. "The Effect of Training of Teachers on the Progress of Children in One-Teacher Schools in Pennsylvania." Columbia. Evenden.

225. Hadsall, Leo F. "A Comparative Study of Extension Methods in Science Education through the Use of the Printed Page and Personal Visitation." Cornell. Palmer.

226. Hager, Walter E. "Change in Students' Fields of Specialization with Relation to Subsequent Placement and Progress." Columbia. Linton.

227. Haggerty, Agnes Claire. "A Study of Directed Teaching in the Teachers Colleges of California." California. Hockett.

228. Hale, Wyatt W. "Junior College Graduates of 1926 to 1929 in Universities and Four-Year Colleges: Their Assimilation, Success, and Attitude." Stanford. Almack.

229. Hall, Clifton W. "Development of a Socio-Economic Index for the Prediction of School Success." Ohio. Toops.

230. Hall, W. F. "The Professional Movement of Rural School Teachers in Certain Counties of Pennsylvania." Cornell. Butterworth.

231. Halsey, Elizabeth. "The Development of the Motor Skills of Running, Jumping, and Throwing in Girls of Ages Eight to Thirteen." Michigan.

232. Hamley, Herbert R. "The Function Concept in Secondary School Mathematics." Columbia. Reeve.

233. Hamrick, Martin E. "The Determination of a Course of Study in Educational Measurements." Pittsburgh. Buckner.

234. Hanna, John Baker. "College Chapel in the United States." Columbia. Elliott.

235. Harbeson, John Wesley. "A Comparative Study of High School Grades Grouped According to Prevailing California Practices and Recommendation to College." Southern California. Touton.

236. Harmon, Darell B. "The Business Administration of the Small Endowed College." New York. Loomis.

237. Harner, Nevin C. "Factors Related to Sunday School Growth and Decline in the Eastern Synod of the Reformed Church in the United States." Columbia. Elliott.

238. Harper, Heber Reece. "A Comparative Study of World-Mindedness among Students at Certain Selected Universities in the United

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239. Harrington, Burritt C. "The Training of Secondary Teachers in India." Columbia. Evenden.
240. Harrington, H. L. "Score Card for the Mechanical Organization of Junior High Schools." Michigan.
241. Harris, Erdman. "Learning by Doing in Cairo." Columbia. Elliott.
242. Harris, Otto. "The Living Conditions of Instructors in Institutions of Higher Learning in New York City." New York. Stalcup.
243. Hathaway, Gladys M. "The Purposes for Which People Read." Pittsburgh. Yoakam.
244. Hay, H. W. "Unrealized Assessments for School Purposes." Pittsburgh. Davis.
245. Haupt, George W. "An Evaluation of Some Science Curriculum Objectives with the Development and Application of Techniques for Placement of Contributory Essential Meanings in the Seventh Grade of the Horace Mann School." Columbia. Powers.
246. Hayes, Harriet. "Standards for Student Residence Halls." Columbia. Sturtevant.
247. Heath, Harrison F. "A Study of the Teaching Load in the Junior College." Stanford. Sears.
248. Heckel, Paul F. "A Study of Teacher-Training for Village Elementary Teachers in South India." Columbia. Evenden.
249. Heiss, Elwood D. "An Investigation of Content and Mastery of High School General Science Courses." Columbia. Powers.
250. Henderson, Elisha Lane. "The Organization and Administration of Student Teaching in State Teachers Colleges and Normal Schools in the United States." Columbia. T. Alexander.
251. Henry, Edwin Ruthvan. "Development of a Series of Comprehensive Diagnostic Tests in Educational Psychology." Ohio. S. L. Pressey.
252. Hereford, E. H. "Some Influences That Have Brought about Changes in Programs of Study in Texas High Schools within the Last Fifty Years." Texas. Henderson.
253. Herndon, Thomas C. "A Study of the Benzaldehyde Electrode." Peabody. Webb.
254. Hirst, C. M. "State Equalization in Relation to School Building." Peabody. Cocking.
255. Hissong, Clyde. "An Evaluation of 'The Activity Concept' in Education." Ohio. Hullfish.
256. Hobart, Clyde Monroe. "The Contribution of Mathematics to a Liberal Education." Ohio. Bode.
257. Hoh, Phoebe Y. T. "Home Demonstration Work in the U. S. as a Suggestive Procedure for the Education of Girls and Women in Chinese Villages." Columbia. Carney.
258. Holland, B. F. "Relation of Sentence Structure and Length to Speed of Reading." Texas. Gray.
259. Holmes, Roger Wellington. "A Philosophic Study of Educational Doctrines, with Special Reference to the Idealism of Giovanni Gentile." Harvard. Holmes.
260. Hooker, Grover C. "The Origin and Development of the University of Mississippi." Stanford. Almack.
261. Hooper, Laura. "A First Grade Vocabulary Study." Yale. Gambrill.
262. Horstick, Simon E. "A Study of

Sources of Revenue for Education in New Jersey." Pennsylvania.

263. Howe, Harriet Emma. "Education for Librarianship, with Special Reference to Training Teachers of Library Science." Harvard. Brewer.

264. Hsii, Jennie. "A Critical Analysis of Certain Problems in the Higher Education of Women in China." Columbia. Sturtevant.

265. Hulse, M. L. "A History of Teaching Method Showing Development of Techniques." Cornell. Jordan.

266. Hulsizer, Allan L. "Interest Factors in Boys' and Girls' Reading Vocabulary as Indicated by Highly Preferred Reading Material." Columbia. Dunn.

267. Hunsberger, Byron. "The Latin Word Knowledge of First Year Pupils." Pennsylvania.

268. Hussey, Marguerite M. "Principles and Methods of Teaching Health." New York. Nash.

269. Iffert, Robert Earl. "A Study of Unit Costs at the University of Pittsburgh." Pittsburgh. Jones.

270. Iverson, P. J. "Financing of Public School Education in North Dakota." Cincinnati. Cook.

271. Ives, J. D. "Ecological Conditions in Relation to the Animal Life of Cave Entrances." Peabody. Shaver.

272. Jacobsen, Ernest A. "Some Factors in the Educational Program of County School Units." California. Peterson.

273. Jacobson, Paul B. "A Remedial Program for the Inefficient Silent Reader in the Ninth Grade of the High School." Iowa. Kirby.

274. Jeep, H. A. "Teacher Supply and Demand in Iowa." Iowa. Lindquist and Peterson.

275. Jenkins, Frank. "A Reorganization of Secondary Education in Mississippi." Peabody. Knudsen.

276. Jivanayakam, Daniel. "Training Teachers for English Schools in Travancore." Columbia. Bagley.

277. Johns, Watson L. "Teacher College Libraries." California. Hart.

278. Johnson, Carl E. "An Experimental Study of the Creative Activities of the Intermediate Grades." Wisconsin. Barr.

279. Johnson, Ruth Maude. "Learning Involved in the Ability to Write Certain Chemical Equations." Columbia. Powers.

280. Jones, A Drummond. "Some Philosophic Points of View on Education Held by Teachers." Columbia. Raup.

281. Jones, H. L. "Relation of the Preparation of Teachers to Professional Standards for Teachers." Peabody. Cocking.

282. Jordan, Floyd. "The Organization of Courses of Study." Pittsburgh. Gould.

283. Kaulfers, Walter. The "Prediction of Success in Spanish." Stanford. Almack.

284. Kelly, E. Lowell. "Insight as a Factor of General Intelligence." Stanford. Terman.

285. Keene, Archie Timothy. "Implications of Recent Psychological Research for Educational Method." Indiana. Smith.

286. Kelley, Victor H. "An Experimental Study of Certain Techniques for Testing Word Meanings." Iowa. Greene.

287. Kelson, Everett. "Technical Procedures in the Making of Schedules for Secondary Schools." Pennsylvania.

288. Kennedy, Ruth. "Resistant Be-

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289. Kent, Ronald W. "Curriculum Revision in the Essex County Vocational Schools." New York. Pickett.

290. Kinney, Ernestine A. "An Analysis of the Student Personnel Problem in a Small College with Particular Reference to Occidental College." California. Lee.

291. Kirkham, Francis W. "Educational Accounting of Youth to Eighteen Years in a Rural Consolidated School District." California. Lee.

292. Kirtley, James T. "Attitude of Church toward Organized Labor." Peabody. Ault.

293. Kirstetter, Newton J. "The Study Habits of Adults." Pittsburgh. Yoakam.

294. Knight, James. "Study of the Development of Reading Habits in Spanish-Speaking Children by the Technique of Eye Movements." Texas. Gray.

295. Koch, Samuel. "History of Jewish Education in America." Washington.

296. Koon, Cline Morgan. "The Growth of Educational Broadcasting for Classroom Use." Ohio. Lewis.

297. Kotinsky, Ruth. "The Philosophy of Adult Education." Columbia. Kilpatrick.

298. Kramer, Grace A. "The Effect of Certain Factors in the Verbal Arithmetic Problem upon Children's Success in Solution." Hopkins. Bamberger.

299. Kiderna, Jerome George. "Standards for the Construction of Professional-Content Textbook in Physics." Columbia. Bagley.

300. Kurani, Habib. "A Study of the Selective Process in Admission to the Liberal Arts College." Columbia. Linton.

301. Lambert, Richard E. "Adult General Education: A Study of the Place of Institutions of Higher Learning in Adult General Education in the United States." Columbia. O'Rear.

302. Landman, J. H. "Human Sterilization in the United States." New York. Zorbaugh.

303. Langdon, Grace. "Analysis of Some Relationships among Teaching Acts in Nursery School, Kindergarten, and First Grade." Columbia. T. Alexander.

304. Langford, H. "The Teacher: An Evolutionary View." Columbia. Kilpatrick.

305. Lamp, Charles J. "Experimental Determination of Aptitude for Special Musical Instruments." California. Hart and Ruch.

306. Lantz, W. W. "Effect of a Study Guide in Teaching High School Literature." Pittsburgh. Buckner.

307. LaPoe, James L. "College and University Faculties." Ohio.

308. Lash, Frederick M. "Personality Traits and Teaching Success." Washington.

309. Lau, Lawrence Bung Lit. "An Analysis of Appeals Used in Recruiting for Foreign Missionary Service, with an Evaluation of the Aims and Purposes of the Missionary Enterprise." Harvard. Brewer.

310. Lawres, Irving A. J. "The General Examination for the Bachelor's Degree." Columbia. Evenden.

311. Lee, John Samuel. "A Study of Teacher Training Offered in Secondary Schools in the United States." Columbia. Carney.

312. Leech, Carl G. "Constitutional and

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313. Leighton, R. W. "Improvement of the Essay Type of Examination in the Social Sciences." Oregon.

314. Leinbach, Earl G. "Legislative Inducement Grants." Yale. Spaulding.

315. Lewis, Hallet Nixon. "An Investigation of the Possibility of Developing a Technique of Predicting Group Membership through an Analysis of Overt Personal Attitudes." Columbia. Kulp.

316. Lewis, Russell A. "An Adequate Child Accounting System for Schools of Fifteen Hundred Pupils and Under." Texas. Ayer.

317. Lilliedale, Juanita. "Salvaging Records for the Prediction of College Success." Ohio. Toops.

318. Lincoln, Mildred Ella. "Educational and Vocational Information as a Part of a Guidance Program with Proposals for Measuring Results." Harvard. Brewer.

319. Livesay, Thayne M. "A Survey of Pupil Population in the Territory of Hawaii." Washington.

320. Lochhead, Jewell. "The Education of Young Children in England." Columbia. Kandel.

321. Logan, Conrad Travis. "Fundamentals in English Composition." Columbia. Baker.

322. Long, Edgar. "The Predictive Value of the Iowa Content Examination." George Washington.

323. Long, Hollis M. "Public Secondary Education for Negroes in North Carolina." Columbia. Kefauver.

324. Long, John Alexander. "Motor Abilities of Deaf Children." Columbia. Pintner.

325. Loofbourow, Graham C. "The Validity of Personality Tests for the Prognosis of Delinquency." California. Keys.

326. Loomis, Burt W. "The Educational Contribution of Richard Edwards." Peabody. Crabb.

327. Lowden, Joseph J. "A Comparative Study of Ohio's Public School Systems." Ohio. Reeder.

328. Lowry, Ellsworth. "Supply and Demand Aspects of the Present Program of Teacher Training Sponsored by the State Department of Public Instruction, Pennsylvania." Pittsburgh. Rohrbach.

329. Lumley, Frederick Hillis. "A Study of Type of Reactions in Learning a Letter Maze." Ohio. Renshaw.

330. Lunceford, Albert E. "A History of Public Elementary and Secondary Education in Arizona Since Statehood." Stanford. Almack.

331. Lutz, Paul Edward. "The Grade-Placement of the Subject Matter of History." Columbia. Johnson.

332. MacNeel, Joseph R. "A Study of Scholarship in Graduate Courses in Education at Teachers College to Determine the Relative Effectiveness of Various Types of Undergraduate Preparation." Columbia. Kitson.

333. MacNitt, R. D. "Introversion and Extroversion in the High School." Michigan.

334. McCarty, Lucy. "A Comparative Study of Two Methods of Teaching Shorthand." Pittsburgh. Buckner.

335. McCausland, Harriet. "An Application of the Parallel Passage Test to the Dating of Shakespeare's Sonnets." Stanford. Cubberley.

336. McCloy, Charles Harold. "The

Measurement of Athletic Ability." Columbia. Williams.

337. McCrae, Mary Helen. "Organization of High School Libraries." Washington.

338. McDonald, L. C. "Problems Connected with the Selection of Textbooks." Texas. Ayer.

339. McElhinney, Charles F. "A Test to Measure Certain Problems in the Field of Social Studies." Columbia. Newlon.

340. McElroy, Frank D. "The Preparation of Teachers in the Liberal Arts College." Ohio. Lewis.

341. McGraw, Myrtle Bryan. "A Comparative Study of a Group of Southern White and Negro Infants." Columbia. Pintner.

342. McIntire, George Radcliffe. "The Budgetary Control of City School Expenditures." Southern California. Hull.

343. McLees, Mary Hunter. "A Study of the Elementary Teaching Personnel of Hunterdon, Morris, Sussex, and Warren Counties, New Jersey, with Particular Reference to the State Program of Teacher Training." Columbia. Carney.

344. McNall, Jessie J. "A Study of the Content and Organization of Materials Offered in Teacher Training Institutions together with an Examination of the Methods Used Involving Visual Instruction." Cornell. Palmer.

345. Mackert, Charles LeRoy. "Amateur Athletic Organization." Columbia. Williams.

346. Mackintosh, Helen K. "A Critical Study of Children's Choices in Poetry." Iowa. Horn.

347. Magee, Herman J. "Unit Costs of Instructional Salaries for Normal Schools and Teachers Colleges." Columbia. Evenden.

348. Maguire, William. "Catholic Secondary Education in the Diocese of Brooklyn." Catholic University. Rooney.

349. Malin, J. E. "Construction of a Diagnostic Test in the Mechanics of High School Chemistry." Pennsylvania.

350. Mallary, Benjamin E. "Studies on Diagnostic Tests for Teaching in Vocations." California. Lee.

351. Mallory, A. E. "A Definition of the Unit in High School Plane Geometry." Peabody. Wren.

352. Mandrey, W. H. "A Program of Higher Education in America." Yale. Spaulding.

353. Manwiller, Charles. "The Relative Effectiveness of Professional Courses in the State Teachers College." Pittsburgh. Rohrbach.

354. Maricle, V. Neal. "A Study of the Fellowship Training Plan of the YMCA." Columbia. Elliott.

355. Marshall, Edna M. "Evaluation of Types of Practice Teaching." Columbia. Dunn.

356. Martens, Elise H. "An Experimental Investigation of Behavior Problems." Stanford. Cubberley.

357. Martin, Helen V. "Factors Other than Intelligence Conditioning the Academic Success of University Freshmen." Ohio. L. C. Pressey.

358. Martin, Theodore Day. "Instruction in Professional Ethics in Professional Schools for Teachers." Columbia. Bagley.

359. Mason, Frances V. "An Investigation of the Records of Teachers in Hospitals for Mental Patients." New York. Benson.

360. Mathew, Cheruvather Cheru. "Some Aspects of American Adult Educa-

tion and Their Application to India." Columbia. Carney.

361. Mathias, Willis David. "The Relationship between Ideas of God and Conduct." Columbia. Elliott.

362. Matthews, Burrus. "A Comparative Study of Freshmen Entering State and Private Colleges in Alabama." Peabody. Crabb.

363. Matthews, J. C. "The Educational Contributions of Joseph Baldwin." Peabody. Crabb.

364. Matthews, R. D. "The Development of Opportunity for Post Primary Education in England, 1900-1930." Pennsylvania.

365. Maxwell, George. "A Descriptive Study of Character Education Procedures in the Public Schools of Denver, Colorado." Columbia. Elliott.

366. Maxwell, Paul A. "Cultural Natural Sciences for the Junior High School." Columbia. Snedden.

367. Menger, Clara. "The Variability in Range of Expressed Vocational Choices of Pupils at Each Grade Level." Columbia. Kitson.

368. Merriam, Thornton Ward. "Some Factors Associated with Success in Professional Training for Social Work. Columbia. Elliott.

369. Merrill, Reynold Cluff. "The Efficiency of Special as Compared with General Methods Courses in a Teacher-Training Program for Elementary Schools." California. Hart.

370. Metcalf, Arthur A. "Some State Activities in the Development of Citizenship Teaching in the Public Schools." Michigan.

371. Meyer, Alelphia. "The Ecological Relations of the Animals of the Cedar Glades." Peabody. Shaver.

372. Michel, Matthew. "Sex Education in the Catholic High School." Catholic University. Jordan.

373. Miller, Marion M. "An Analysis of the Subject Matter and the Techniques for Parent Education Groups." Columbia. Woolley.

374. Miller, Vernon L. "The Study of Bodily Changes During Sleep in Children." Ohio. Renshaw.

375. Mitchell, Claude. "Development of State Control in Pennsylvania." Pittsburgh. Davis.

376. Moody, Ancil Earl. "Certain Legal Aspects of School Administration." Ohio. Lewis.

377. Moran, Hugh Anderson. "Significant Factors in the Ancestry and Social Inheritance of Leading Americans." Columbia. Elliott.

378. Morgan, Barton. "Certain Phases of Adult Education in Farm Organizations." Iowa. Robbins.

379. Morgan, William H. "Trends in Programs and Policies of the Intercollegiate Y.M.C.A." Columbia. Elliott.

380. Morlan, Grover C. "An Historical Study of Moral Education in the American Public Schools." Iowa. Ensign.

381. Mulgrave, Dorothy I. "The Ph.D. Degree in English: An Investigation of the Requirements for the Degree and Study of the Attitudes of College English Teachers Who Have the Degree Regarding the Improvement of These Requirements." New York. Creager.

382. Mulhern, James A. "Development of Secondary Education in Pennsylvania." Pennsylvania.

383. Munzenmayer, Lester H. "Greater Equalization of Educational Opportunities in Ohio through a Salary Schedule." Ohio. Reeder.

384. Nathan, Winfred B. "A Study of

Health Conditions in Harlem, New York City, Based on a Full Five Year Mortality Record with Implications for Health Education." New York. Payne.

385. Nelson, Esther Marion. "Content of Student Teaching in the Elementary School Field." Columbia. T. Alexander.

386. Nelson, George E. "Subject Matter of Elementary Biological Courses in College." Columbia. Powers.

387. Nelson, I. I. "Changes in Materials and Methods in Elementary Algebra from 1830 to 1930 as Revealed in the Textbooks." Texas. Henderson.

388. Neulen, Leon Nelson. "A Study of Certain Factors in the Allocation of Arithmetic Problems Involving One or More Reasoning Steps." Columbia. McGaughy.

389. Newland, Thirl Ernest. "Implications of Some Analyses of Illegibilities for the Teaching of Handwriting." Ohio. S. L. Pressey.

390. Newlin, James Curtis. "Some Differential Factors in the High School Seniors' Prospective College Attendance." Ohio. Toops.

391. Newmark, David. "A Study of Students in a Certain Class in the Philadelphia Normal School." Pennsylvania.

392. Newsom, N. William. "The Legal Status of the County Superintendent." New York. Withers.

393. Nichols, John R. "A Modern History of Education in California, 1890-1928." Stanford. Almack.

394. Noffsinger, Forest Ruby. "The Development of a Composite Achievement Test on the Professional Courses in the Elementary Teacher Training Course." Indiana. Smith.

395. Norlander, E. J. "A Study of Swedish People in America." Pittsburgh. Carrier.

396. Oakes, Mervin Elijah. "Developing Professional Content for the Training of Teachers in Biology in Secondary Schools." Columbia. Powers.

397. O'Connor, Zena C. "The 'Runaway' Child in the Correctional Institution." Columbia. L. S. Hollingworth.

398. Omwake, Louise. "The Influence of Barbital Addiction on Learning in White Rats." George Washington.

399. Orleans, Joseph Barnett. "A Study of Prognosis of Probable Success in Algebra and in Geometry with Application of Results to Classroom Work." Columbia. Reeve.

400. Orth, Fred W. "A Critical Study of the Handwork Activities in the Public Elementary Schools of California." California. Kemp.

401. Osborne, Ernest Glenn. "A Survey of the Importance of Certain Factors for 'Original' or 'Creative' Activities among Younger Children." Columbia. Watson.

402. Packer, Garrah. "An Analysis of Questions Asked by Parents in Child Study Groups." Iowa. Robbins.

403. Pallett, Earl M. "Student Undergraduate Mortality in the University of Oregon." Oregon.

404. Pangburn, Jessie M. "The Evolution of the American Teachers College." Columbia. Evenden.

405. Pannell, Henry Clifton. "A Program for the Training of High School Teachers in Alabama." Columbia. Strayer.

406. Parker, Rose E. "A Technique of Study in an Introductory Course in Education." Wisconsin. Clapp.

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409. Penningroth, Paul. "Public Opinion on International Affairs in Certain Communities." Columbia. Watson.

410. Perkins, Reba. "The Effect of a Study Guide in Teaching Composition." Pittsburgh. Buckner.

411. Perz, John. "Catholic Secondary Education in Spain." Catholic University. Rooney.

412. Peterson, Axel George. "The Training of Elementary and Secondary Teachers in Sweden." Columbia. T. Alexander.

413. Peterson, LeRoy. "Madison's Ability to Support Public Education." Wisconsin. Fowlkes.

414. Pierce, Mary Dowdell. "An Historical Survey of Student Teaching at the State Teachers College, Farmville, Virginia." Columbia. T. Alexander.

415. Pollak, Jacob B. "The Problem of Reform Jewish Education in the U. S. in the Light of its Future Needs." Columbia. Case.

416. Pope, Ruth Vesta. "Factors Affecting the Elimination of Women Students from Selected Co-Educational Colleges of Liberal Arts." Columbia. Sturtevant.

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419. Potts, Philip C. "Secondary Education in Maryland before 1800." Hopkins. Blackburn.

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421. Pruitt, Clarence M. "A Determination of Some of the Major Conceptions of Science that are Fundamental to an Understanding of the Problems of Current Life." Columbia. Powers.

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424. Rediger, Joseph L. "Teaching of English in the High School." California. Williams.

425. Reed, Jennie. "Special Provision for Training of Gifted Children." Washington.

426. Reese, Webster Paul. "An Evaluation of the Program for Training Secondary Teachers in the State of Kansas." California. Kemp.

427. Reppen, Nels O. "Supervision from the Teachers' Point of View." Wisconsin.

428. Riddle, John Ingle. "A Comparative Study of Small and Large Rural High Schools in Alabama." Columbia. Kefauver.

429. Richards, Katherine L. "The Educational Values in the Observance of Christmas, in the Protestant Church Schools of the United States: An Historical Study." Columbia. Case.

430. Ricksacker, C. W. "A Proposed Junior College for Youngstown, Ohio." Pittsburgh. Davis.

431. Riefling, B. Jeanette. "The Educational Values of Junior Red

Cross Materials and Activities as Used in the Schools." Columbia. C. Alexander.

432. Roach, William L. "History of Education in the Territory of Oklahoma." Stanford. Almack.
433. Roberts, Franklin C. "The Evolution of the Parochial Schools in Massachusetts." Boston. Wilde.
434. Robinson, William M. "Observation and Practice Teaching in the Two-Year Curricula for the Preparation of Rural Teachers." Columbia. Bagley.
435. Rodhedieu, Charles A. "Rousseau's 'Reveries of a Solitary Wanderer' as a Corrective to his Previous Literary, Social, Moral, and Educational Views." Peabody. Roehm.
436. Rose, Anna Loretta. "A Developmental Study of Educability." Columbia. Sturtevant.
437. Rose, Flora. "A Nutrition Health Study of Five-thousand Belgian School Children as a Basis for Health Education." Columbia. Rowell.
438. Rosebrook, Wilda Mae. "Disabilities and Deficiencies of Superior Children." Ohio. Goddard.
439. Rosenstengel, W. E. "A Problem in Junior College Administration." Missouri.
440. Ross, Verne Ralph. "The Relation of Musical Ability to Intelligence and Achievement." Southern California. Raubenheimer.
441. Rowell, Dorothy Chase. "The Structure of Certain Index Correlations Used in Educational Research." Columbia. Ruger.
442. Rudisill, Mabel. "Personality and Teaching Success." Wisconsin. Barr.
443. Rugen, Mabel E. "The Organization of Physical and Health Education in Teacher Training Institutions Preparing Teachers for the Elementary Grades." New York. Nash.
444. Russell, Earle. "Influence of Certain Factors in Teacher Training." Yale. Spaulding.
445. Russell, Floyd O. "A Study of the Administrative and Supervisory Practices in Ohio in the Light of Principles of Educative Leadership." Ohio.
446. Rust, Metta Maund. "The Effect of Resistance on Intelligence Test Scores of Young Children." Columbia. L. S. Hollingworth.
447. Ryder, Stephen W. "Shifts in Educational Viewpoint in Christian Missions in Japan, Especially as Illustrated by the History of the Japan Mission of the Reformed Church in America." Columbia. Fleming.
448. Sanders, Walter F. "Administration of a Plan of Supervision of Instruction for the Presbyterian Colleges, U.S.A., with a Special Study of Certain Institutions." Ohio. Lewis.
449. Sartorius, Ina C. "Bases of Generalization in Spelling." Columbia. Gates.
450. Saunders, Douglas. "Adult Vocational Agricultural Education." California. Lee.
451. Schad, J. Harry. "Basic Legal Principles Underlying the Rights and Obligations of the Student with Respect to School Administration." Hopkins. Cook.
452. Schleier, Louis Martin. "A Teacher-Training Program for Teachers of Mentally-Handicapped and Physically-Handicapped Children in the Public Schools." Columbia. Bagley.

453. Schlorff, Paul W. "An Experiment in the Measurement and Modification of Racial Attitudes in School Children." New York. Zorbaugh.

454. Schwartz, Lawrence W. "Jewish Youth Education." Columbia. Kandel.

455. Scott, H. P. "Influence of Non-Scholastic Activities on Academic Achievement in a Municipal College." Michigan.

456. Scott, Robert R. "The Educational Bearings of the Stimulus-Response Concept." Ohio. Bode.

457. Sears, Richard. "The Influence of Changes in Speed and Difficulty of Addition upon the Psychogalvanic Response." Michigan.

458. Seidlin, Joseph. "A Critical Study of the Teaching of Elementary College Mathematics." Columbia. Reeve.

459. Seifert, Carl. "Development of Theories of Method in the United States." Pennsylvania.

460. Selke, George Albert. "The Activities of the Superintendent of Schools in the Villages and Cities of Less than Thirty Thousand in Minnesota." Columbia. Strayer.

461. Selle, Erwin Stevenson. "A Sociological Study of Certain Aspects of the Organization and Activities of the National Education Association." Columbia. Kulp.

462. Sharratt, William B. "The Theory of Religious Education of Alexander Campbell and Its Influence upon the Educational Attitude of the Disciples of Christ." New York. Hamilton.

463. Shibli, Jabir. "Changes in the Teaching of Geometry Since 1900." Columbia. Reeve.

464. Shipley, Gertrude T. "An Evaluation of Supervised Study and Small Group Discussions in a Normal School." Columbia. McGaughy.

465. Shollenberger, F. J. "Use of Motion Pictures in the Teaching of College Physics." Pittsburgh. Jones.

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468. Silas, Paul G. "A Critical Study of Errors in First Year Algebra." Iowa. Knight.

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471. Sister Joseph Mary Raby. "Progressive Education in the Light of Catholic Philosophy." Catholic University. Jordan.

472. Sister M. Aquinas Gude. "A Test of Achievement in Religion." Catholic University. Foran.

473. Sister M. Immaculata Kramer. "The Relation of Distribution of Time to Permanence of Retention of Drill in the Fundamentals of Arithmetic." Catholic University. Foran.

474. Sister Mariella Bowler. "The Teaching of Mathematics in the Secondary School." Catholic University. Rooney.

475. Slavens, Jean. "Guidance Problems in High School." Columbia. Strang.

476. Smeltzer, Clarence. "The Develop-

ment of Special Tests and Diagnostic Methods in Educational Psychology." Ohio. S. L. Pressey.

477. Smith, F. Marion. "A Study of the Organization and Function of Boards of Trustees of the Colleges and Universities of the Methodist Episcopal Church." Columbia. Evenden.

478. Smith, Helen Raymond. "Unconstructive Teacher-Pupil Relationships, as Seen by the Visiting Teacher." Columbia. Watson.

479. Smith, Henry G. Weston. "The Baptist Theory of Church Membership." Columbia. Case.

480. Smith, Maurice L. "Equalization of the School Tax Burden in Michigan." Stanford. Almack.

481. Smith, Max. "The Effect of the Biserial r of Items upon a Test's Total Correlation with a Criterion." Columbia. Spence.

482. Smith, Randolph B. "The Development of a Valid and Reliable Instrument for the Measurement of Inferiority Feelings at the Senior High School Level." Columbia. Elliott.

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484. Smith, Sim Joe. "The Legal Status of the Adult Education Movement." Columbia. Strayer.

485. Smith, Rulon. "A Professional Code of Ethics for City School Superintendents of the United States." California. Peterson.

486. Smith, Wiley F. "Relative Quickness of Visual and Auditory Perception." Peabody. Peterson.

487. Snedaker, Mabel. "An Investigation of the Effect of Musical Setting upon Memorization and Interest in Poetry." Iowa. Horn.

488. Snowden, F. B. "An Investigation of Transfer in the Learning of Higher Decade Addition." Pittsburgh. Yoakam.

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490. Sparks, Loren. "Interrelation of Abilities of an Unselected Twelve-Year-Old Group." California. Ruch.

491. Sparling, Edward James. "The Status of Students at Long Island University with Respect to Choice of Vocation." Columbia. Kitson.

492. Spencer, Herbert L. "An Investigation of Typewriting in the Elementary School." Pittsburgh. Yoakam.

493. Spencer, Mary E. "The Professional Education of Elementary Teachers in the Field of Health Education." Columbia. Wood.

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496. Starrak, James A. "A Scale for Evaluating the Quality of Instruction in College Classes." Boston. Wilson.

497. Steininger, Russell. "A Study of the Theological Seminaries and Pastors in Service to Determine the Needs for Seminary Curricula." Pittsburgh. Carrier.

498. Stewart, Margery. "Objectives of Instruction in Chemistry for High School Girls." Columbia. Powers.

499. Stewart, Wilbur Filson. "Records and Reports for State Supervisors

of Agricultural Education." Columbia. Snedden.

500. Stiles, Chester. "The Youth Movement in Germany." Boston. Davis.

501. Stilwell, Catherine F. "Identifying the Point at Which the Quantitative Ceases and the Qualitative Enters in Teaching, and a Suggested Technique for the Latter." Cincinnati. Eby.

502. Storey, Ralph. "History of Education in Denominational Colleges in the Northwest." Washington.

503. Storm, Howard C. "Homogeneous Grouping and Parallel Courses of Study versus Heterogeneous Grouping with One Course of Study." California. Hart.

504. Stout, D. G. "Standards for School Building Plants Accommodating Elementary and High School Grades." Cornell. Butterworth.

505. Stover, James D. "Principles of Selection and Administration of School Equipment." Cincinnati. Cook.

506. Street, Roy Frink. "A Gestalt-Completion Test." Columbia. Pintner.

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510. Taylor, J. Carey. "The Use of Certain Standard Tests in Predicting Junior High Scholarships as Measured by Teachers' Marks." Hopkins. Brooks.

511. Taylor, Helen. "An Experiment in Sectioning of Students in Analytic Geometry According to Previous Mathematics Grades." Illinois. Cameron.

512. Taylor, Hoy. "The Educational Contribution of Barnas Sears." Peabody. Crabb.

513. Talbert, Wilford E. "The Educational Significance of Recent Trends in School Administration in California." Stanford. Cubberley.

514. Thiele, C. Louis. "The Comparative Effectiveness of Three Procedures in Teaching Pupils to Solve Problems in Arithmetic." Columbia. Hillegas.

515. Thomas, Harold Prescott. "Equalizing Teacher Load." Harvard. Dudley.

516. Thomson, Ruth H. "History of the Japanese Education Question in California." Stanford. Almack.

517. Thompson, Russell. "A Study in Character Education." Yale. Tilton.

518. Tibbitts, Fred L. "Coördination in Compulsory Part-Time Education." Stanford. Proctor.

519. Tidwell, Robert Earle. "State Aid in Capital Expenditures for Public Schools of Alabama." Columbia. Strayer.

520. Tinker, William. "A Study of Unit Costs in Pennsylvania State Teachers Colleges." Pittsburgh. Buckner.

521. Tinsley, Gladney J. "Bases for Grouping High School Freshmen." Stanford. Almack.

522. Tisinger, R. M. "Cost Accounting

for School Transportation." Cornell. Butterworth.

523. Tomlin, Frank E. "The Relationship between Achievement in School Subjects and Ethical Knowledge of Pupils, Grades 4, 5, and 6." Stanford. Davidson.

524. Toothman, Harry F. "A Study of the Academic Dean of the Liberal Arts College." Cincinnati. Good.

525. Townsend, Walter B. "Progressive Education in the Intermediate Grades of the Elementary School." Stanford. Almack.

526. Traner, Fred W. "The Actual Objectives of Secondary Education in the United States as Exhibited in Legislation and Practice." California. Rugh.

527. Tsang, C. S. "Nationalism in School Education in China Since the Opening of the Twentieth Century." Columbia. Counts.

528. Turner, Fred. "A Definitive History of the University of Illinois." Illinois. Seybolt.

529. Tyson, George R. "The Status of the Married Teacher in Pennsylvania." Pennsylvania.

530. Uy, Juan T. U. "Principles for the Construction of an Elementary School Curriculum for the Chinese Residents in the Philippines." Columbia. Kandel.

531. Van Houten, Lyman H. "Tenure and Transfer of Pennsylvania High School Teachers with Proposals for a Training Program." Columbia. Evenden.

532. Van Oot, Benjamin H. "Measures of Intelligence as Prognostic of Apprenticeship Success in Ship Building Shop Work." Columbia. Snedden.

533. Voorhis, Thelma G. "A Study of Beginning Reading and Manuscript Writing." Columbia. Gates.

534. Vaughan, William H. "The Educational Contributions of Robert J. Breckenridge." Peabody. Crabb.

535. Wagner, Carlotta Comer. "An Experimental Study of Transfer of Training in Piano Technique." Southern California. Raubenheimer.

536. Wagner, Nancy E. "Aspects of Pragmatism in Education." Ohio. Bode.

537. Walker, Emily Barry. "The Relation of Light Intensity to the Time of Beginning of the Morning Song of Birds." Peabody. Shaver.

538. Walker, Herbert. "A Study of the Ventilation of the Lungs in Connection with Problems of Physical Conditions." Harvard. Holmes.

539. Wallace, Robert F. "The Effect of Temporal Distribution of Practice on the Efficiency of Learning Paired Associates." Ohio. Renshaw.

540. Waller, James Flint. "Outside Demands on the Schools." Columbia. Newlon.

541. Walvoord, Anthony C. "A Study of Reliability and Validity of Teacher Rating Scales." Wisconsin. Barr.

542. Ward, Jesse L. "Factors Affecting Promotion in Academic Rank and Salary in Certain Budgetary-Controlled Institutions of Higher Learning in the U. S." Ohio. Klein.

543. Warner, Harold E. "Class Scheduling in Junior High Schools." George Washington.

544. Watkins, Isabel S. "Vocational Objectives of California Junior College Students in Relation to Intelligence, Achievement in High

School Subjects, Educational Expectations, and Economic Status." Stanford. Eells.

545. Watson, Maud E. "Emotional Factors in the Lives of Parents Which Affect the Behavior of Children." New York. Zorbaugh.

546. Wee, Kok Ann. "Organization of the Department of Physical Education in the Colleges of Liberal Arts in American Universities." Columbia. Williams.

547. Weitzel, Henry Irving. "A Four Year Follow-up Study of 999 Tenth Grade Pupils." Southern California. Weersing.

548. Wellman, Rowena. "An Experimental Study of Factors in Stenographic Ability." Columbia. Kitson.

549. Wen, L. C. "The Need of a Social Program for Education." Ohio. Bode.

550. Werner, E. Carl. "An Investigation into the Employment History of Certain Minors of Continuation School Age in Philadelphia for a Period of Five Years." Pennsylvania.

551. West, Paul. "Pupil Adjustment in an Elementary School." Columbia. Mort.

552. West, Guy A. "Subject 'A' Examinations." California. Ruch.

553. Whaley, Guy V. "The Curricula of California Teachers' Colleges." California. Kemp.

554. Wheat, Leonard B. "A Study of Word Associations to the Five-hundred Most Commonly Used Words in the English Language." Columbia. Pintner.

555. Whitcraft, Leslie H. "Some Effects of the College Entrance Examination Board on the Teaching of Mathematics in the Secondary Schools." Columbia. Reeve.

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557. White, Annabel Lee. "Retention of Elementary Algebra through Quadratics after Varying Intervals of Time." Hopkins.

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559. Whytock, Norman Robert. "Trends in the Development of the Junior College." Southern California. Touton.

560. Wilber, Louise. "Work That Rehabilitation Agencies Are Doing in Behalf of the Blind." California. French.

561. Wilcox, Clarence R. "Private Secondary Education in the Association of Colleges and Secondary Schools of the Southern States." Hopkins. Bamberger.

562. Wilcox, Floyd C. "Transfer of Students from Junior College to the University." Stanford. Proctor.

563. Wilcox, George M. "Education in Modern Greece." Columbia. Kandel.

564. Wiley, Will E. "Analysis of Difficulties in Elementary School Reading." Stanford. Almack.

565. Williams, Edward I. F. "The Employment of Extra-Mural Schools for Student Teaching in Teachers Colleges." Columbia. Evenden.

566. Williams, L. W. "Turnover of High School Teachers in Illinois." Illinois. Monroe.

567. Wilson, Howard Eugene. "The Fusion of Social Studies in the

Junior High School: A Critical Analysis." Harvard. Spaulding.

568. Wilson, William K. "Service Mathematics for Freshman Chemistry at Ohio State University." Ohio. Tyler.

569. Winslow, Harry David. "The Administration of Adult Education in Public School." Columbia. Mort.

570. Witty, Paul Andrew. "A Study of Deviates in Versatility and Sociability of Play Interest." Columbia. Gates.

571. Wood, Charles Bruce. "Practice Teaching in Europe (England, France, and Germany)." Columbia. T. Alexander.

572. Wood, Edgar Otto. "History of Public Education in Louisiana During the Reconstruction Period." Texas. Eby.

573. Wood, Waldo Emerson. "Relation of Age to Learning, Education Being the Selective Factor." Indiana. Somers.

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575. Woods, Velma E. "An Analysis of Errors in Arithmetic Made by Teachers in Training." California. Ruch.

576. Wrenn, C. Gilbert. "Experimental Vocational Studies." Stanford. Almack.

577. Yackey, Lena Millicent. "Women's Magazines as Factors in Foods Education or Women's Magazines as Factors in Homemaking Education in Problems of Food." Columbia. Bonser.

578. Yeomans, Arthur. "Qualities of Good and Poor Mathematics Teachers." Washington.

579. Yockey, F. Milton. "Relation between Thievery in Public Schools and Conditions Subject to Administrative Control." California. Hart.

580. Young, Harry F. "Sabbatical Leave for Public School Teachers in the United States." Cincinnati. Cook.

581. Young, Isabel S. "Spontaneous Play Activities of Elementary School Children." Yale. Gambrill.

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583. Young, Robert Allan. "Diagnosis and Remedy of Disabilities in Reading." Harvard. Dearborn.

584. Young, Wm. L. "The Junior College Movement in Relation to Higher Education in Ohio." Ohio. Lewis.

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586. Ziegler, Donald George. "Broadening of High School Educational Opportunities through Correspondence Study." Columbia. Mort.

587. Zubin, Joseph. "A Technique for Measuring the Motive Power of Rivalry." Columbia. Pintner.